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VIEWS, NEWS AND INTERVIEWS.

The importance of uninterrupted telegraphic communication between far-off countries and the centers of commerce and business has never been more forcibly illustrated in recent years than during the exciting episodes of last week in South Africa. As soon as the failure of Captain Jameson's expedition against the Boers in the Transvaal became known the British Government obtained possession of the only available cable line to South Africa. This was done ostensibly to keep the line clear for government dispatches, and its use for the transmission of private, business or news messages was prevented. Business men in London having important relations with Cape Town were put to great inconvenience and probably considerable financial loss. A Berlin correspondent asserts that German business men interested in South Africa will claim damages from the Eastern Telegraph Company for blocking German dispatches.

Silk may be gilded by electroplating it, after it has been made to conduct electricity, by soaking it in some metallic salt, such as nitrate of silver, acetate of lead or copper, etc. The silk thus prepared retains its flexibility and softness. The method, it is said, is applicable to laces, muslins, tulles, etc.

The present discussion of Schomburgk's line and other matters concerning Venezuela brings up many reminiscences of his experience in that country to Mr. J. H. Vail, of New York city, who has recently been appointed engineer of the railway department of the Electric Storage Battery Company, of Philadelphia. On one occasion when Mr. Vail was visiting Caracas he received a call from a native planter who had ridden 600 miles on mule back over the mountains to see him. The planter had previously purchased an electric lighting plant, which developed a "bug" and refused to work. Hearing that Mr. Vail was in Caracas, he rode in to see if he could tell what was the matter with the lighting plant. While in Venezuela Mr. Vail had several interviews with President Crespo.

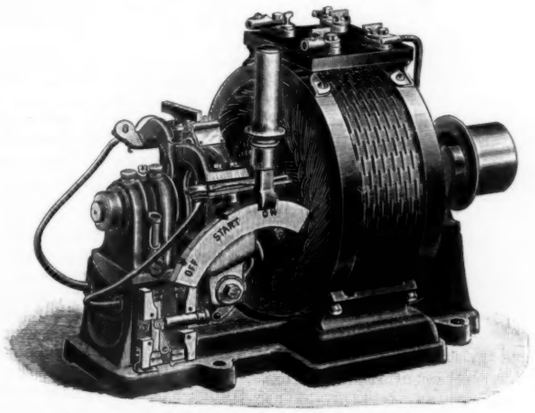
Horseless carriages have now become a feature of the boulevards of Paris.

One Washington Davis, who says he is "related to both General Grant and Jefferson Davis and is yet young," has a great scheme for defending New York harbor in case of war. He proposes to plant two cannon five feet apart on the Long Island shore and two more on the New Jersey shore, each completely "wrapped with electric wire. "He says that by this means he can throw any ship's compass out of range ten miles at sea, so that it can not enter New York harbor. When the ship's compass points the wrong way there is no use for them to try to fire their guns.

One of the attractive sights of South London during Christmastide, says *Lightning*, is undoubtedly that great modern shopping thoroughfare known as the Electric Avenue at Brixton. It has been transformed, as heretofore, into a fairy-like scene. Tall Christmas trees line the covered promenade, and overhead the avenue is gayly festooned with evergreens. Hundreds of foliated Edison-Swan lamps, in tulips of different shades, shed their tinted light from the green festoons, and more powerful illumination is afforded by eighty Fyfe-Main arc lamps of 2,000 nominal candle-power. Variety is given to the illuminations by the colored lights having a seasonable game at "bo-peep" or "hide-and-seek" for a few minutes at the beginning of each hour, from seven o'clock in the evening till ten.

The London *Lancet* calls attention to the fact that when horseless carriages become popular the sanitation of large cities will be a simpler matter. Contagion from the stable pit will be at an end and glanders and other diseases derived from the horse will disappear.

It was announced last week that Dr. Charles E. Bullman, of Plainfield, N. J., formerly editor of the *Safety Valve*, and associate editor of the *Engineering and Mining Journal*, had been selected as secretary of the Venezuelan Commission. Dr. Bullman is a graduate of Columbia School of Mines, and spent ten years in the South American republics, where he was engaged as mining expert. He speaks Spanish, German, Dutch and French fluently, and, being thoroughly acquainted with the geography of the country, is said to be exceptionally well qualified for the position.



A New Alternating-Current Power Motor.

A New Alternating-Current Power Motor.

The Emerson Electric Manufacturing Company, of St. Louis, Mo., who claim to be pioneers in the manufacture of alternating-current fan motors, are now introducing to the trade a line of small alternating-current power motors, the one-half horse-power size of which is illustrated herewith. These motors are non-synchronous, though practically constant speed, the speed regulation being within five per cent between "no load" and the rated capacity of the motor. They are said to possess nearly all the features of excellence of a direct-current motor, while being superior in that they, having no commutator in circuit (except while starting), call for no attendance at the brushes. They are absolutely protected from lightning, from being placed on the secondary side of the circuit, and, being arranged for low voltages, they are protected from the burn-outs due to high potentials and broken wires, which are especially troublesome in 500-volt direct-current motors of small size.

No starting-box or other device is required in starting the motor, the stopping and starting being effected by a single lever. This lever moves across a sector (shown in the illustration) with three notches marked respectively "Off," "Start" and "On." The lever is allowed to remain in "Start" notch until the motor has attained its normal speed, when it is pushed to "On." In moving to this latter position the brushes are lifted off the commutator, the external current having no connection with the armature winding in this position. The switch and fuse terminals are mounted on the motor itself, the only wiring required with these motors being the introduction of the circuit leads into the terminals.

The stock sizes of these motors are made by the Emerson company for 16,000 and 7,200 alternations per minute, and for 104 volts. Other voltages and frequencies are made to order. The following are some of the features of merit claimed by the

makers for them, the tests having been obtained with one-half horse-power motors, and still better results are assured for larger sizes: A starting torque 50 per cent in excess of the running torque; a maximum output of 50 per cent in excess of the rated capacity of the motor; a consumption of energy, running free, of less than 25 per cent of that under full load; an efficiency of from 65 per cent to 80 per cent, according to size and frequency; speed regulation within 5 per cent; a very slight diminution of torque until the speed has fallen more than 25 per cent below normal, thus enabling the motor to take care of a large temporary overload by virtue of its momentum, and to regain its normal speed afterward.

The inability to do this is one of the special disadvantages of synchronizing motors, a power factor at full load of 67 per cent on the 130-cycle circuit, and 80 per cent on a 60-cycle circuit for a one-half horse-power machine.

These motors are practically noiseless, except while starting. They are provided with self-oiling, self-aligning, phosphor-bronze journals and a cast-steel shaft, the oil boxes being arranged with gauges and cocks, no expense having been spared to make these parts of the motor of the most approved mechanical construction, as indeed they have to be, since the clearance of the armature is a little more than one-hundredth of an inch.

The Emerson Electric Manufacturing Company are putting these out under their usual guarantee, and are finding a ready demand. They have in preparation sizes from one-quarter to three horse-power, and are prepared to make prompt shipment on the one-half and one horse-power machines of any frequency. Other sizes and a full line are promised by them at an early date.

Another Young Man Heard From. Who Wants Him?

To the Editor of Electrical Review:

The complaining request in the southeast corner of page 365 I can feelingly echo in full, and if you have not shut down on the practice already, would like to have space given to this.

In addition, I can state I am in possession of some chemical knowledge as applied in electricity, besides having mechanical experience. Am a Yankee, in fact, with usual inclination; 19 years old.

Have testimonial from a storage cell company, where part of time I ran a cranky gas engine.

Yours hopefully,

"B,"

Care of C. C. Juster, 439 Geary St.,
San Francisco, Cal.
January 2, 1896.

The local Bell company has received all necessary rights for an extension of its lines from McKeesport to East McKeesport, Pa., and work will be commenced at once.

WHAT NEXT IN ELECTRIC RAILWAY WORK?

READ BEFORE THE CHICAGO ELECTRICAL ASSOCIATION, DECEMBER 20, 1895, BY J. R. CRAVATH.

(Concluded from page 22.)

Another advance that I believe must and will be made soon by American street railways is the keeping of more accurate records of the drop of voltage in the ground return and the voltage of rails with reference to water pipes and other underground conductors. In spite of all that has been said about electrolysis in the last three years, in spite of the inventions and investigations that have resulted in the immense improvement of electric railway return circuits, I think I am safe in saying that there are not half a dozen roads in the country, large or small, that keep any kind of a systematic record of the resistance or drop of potential in the return circuits and the relative voltage to surrounding pipes. I am led to think from things that I have heard that some large roads recently built have return circuits from which little is to be feared from loss of energy or electrolysis. There are others, also recently built, that, from reports, are decidedly the opposite. Whatever the state of affairs on any or all roads, I think that every electric railway engineer will, on sober thought, agree with me that, in view of the immense investment involved in the return circuit, and the possible damages that may arise from ignorance of the conditions, it is absurd not to keep such records, especially as they involve but small investment and little trouble. Drop of potential and resistance tests may be accurately made by using telephone wire running from the power house to the various points on the system. On a large road it would pay to have test wires especially for this purpose. Such tests together with water-pipe readings taken regularly give an intelligent idea of the state of a ground return. In the city where several electric railways are operating water-pipe readings alone, although of value, are apt to be more confusing than enlightening, and the investigator after a long series of readings concludes that the more readings he takes the less he knows about it. This is especially true when the readings are very low. I hardly want to cite English practice as an example for us to follow, but merely wish to call attention to the regulations in force there now regarding electric railway return circuits, as it may give food for reflection and hasten the day when American roads know more about their return circuits.

The English rules require a continuous record to be kept of the drop of voltage between the farthest distant point on the track and the negative bus at the power station. For this purpose a small wire is run from said point on the track to the power house switchboard and connected to the negative bus. A recording voltmeter or similar device records the drop. The English rules say this total drop must never be more than seven volts. I will not discuss this detail, but it seems to me it would be more rational to specify a certain maximum drop per mile rather than a maximum total drop. It is not likely that such rules will be adopted in America, but I think in time the roads themselves will come to accept certain unwritten precepts in this matter and that records will be kept and certain standards lived up to. There is no doubt but that electrolysis can be prevented at the present day and, although a case has not yet come to trial, as far as simple justice is concerned there is not doubt that a railway ought to be liable for damages done by electrolysis, providing it can be conclusively proved that the railway is the guilty party. Street railways have, as a rule, been willing to meet the water-pipe people half way, repair damages, and go to work to remedy the evil. It is probably for this reason that the matter has heretofore been kept out of the courts.

While on the subject of testing, I may speak of another improvement in the details of street railway practice that has come in rather slowly as yet, but which will, I think, become more general as its value is better understood. I refer to the regular testing of motors for insulation resistance and conductivity. This does not require any elaborate arrangement or specially skilled labor. All the insulation tests necessary can be made with a Weston voltmeter reading up to 600 volts. On one road I know of the first thing that is done when a car comes in for its regular inspection is to test it for insulation resistance. If this is below a certain point the car circuits are divided up so that the trouble is soon definitely located. It is needless to say that this system prevents many expensive burn-outs and annoying delays. Mechanical defects in a car equipment, are generally apparent to the eye of the trained car inspector.

Electrical defects are not and can not be discovered until they take the form of serious burn-outs, unless such a method of testing is used. The value of preventive cure in this case is apparent and the practical results attained by such regular testing have been fully demonstrated to be of great value. The antediluvian magneto should be given a long rest from car testing. It has served its purpose well and "fought a good fight." We could not have got along without it, but it is now out of date.

As to improvements in overhead work, I think you will find on Clark street, this city, a comparative novelty that is but the forerunner of a general change in construction work. I refer to the pear-shaped trolley wires. Not that roads already built are going to tear down their present wires and use the pear-shaped, but for new work, where the requirements are heavy, it, or something similar, will probably find wide favor. It was used first on the Nantasket Beach road to supply current to heavy steam trains. It has three times the cross section of the ordinary number 0 trolley wire and for that reason often saves running feeders. Its other advantages are increased trolley contact area and an unbroken surface at the hanger clips. In the change of suburban steam lines to electric, which has begun to take place, a trolley wire which offers the before-mentioned features is an important factor. For such roads the overhead trolley is the only thing just now practicable, and its modification to suit the heavier requirements of a steam road is a great step forward.

It is not safe to assume, however, that the overhead trolley will be used on all steam roads equipping electrically, because the closed-conduit, normally dead-contact-pins system is making a bid for favor in this work, and it may serve as a substitute for the third-rail system for use on steam roads. It would allow the conducting of heavier currents than the trolley and save all troubles and complications at switches.

Great predictions are now being revived regarding the storage battery car. The greatest and most violent activity manifested in the storage battery business lately has been in the way of stock jobbing, and it must be admitted that in this department it is eminently successful. Nevertheless, the storage battery has a field of usefulness as an auxiliary to generating stations and there will, no doubt, in the future be numerous railway plants that will employ it. When it comes to putting it on cars for motive power, that is another matter. The claims at present being made are based on European performances and while they may be all right, American electric railway men have been fooled so often by glowing report from abroad on various subjects relating to their business that most of them will cheerfully wait and let some fellow try the next storage experiment. Experiments are now being begun in America, and after two or three years' steady service we may expect some unquestionable results one way or another.

The last matter to which I wish to call your attention is one which is attracting more widespread interest than any of the foregoing, viz., the application of electric traction to long lines of railway and incidentally the serving of long lines of railway from one power plant. Before this can be done to any extent there must be some radical changes from any methods now in existence, but these changes are well within the control of present engineering ability and knowledge. The most vitally important change will be a much higher voltage on the trolley wires. Some, no doubt, when they hear this, think that they have trouble enough now maintaining insulation against 500 volts and do not care for anything higher. More than the present voltage on our city streets is not to be thought of, but to confine ourselves to 550 volts is to confine the electric railway to territories which can make it profitable to maintain a power plant at the center of every circle of five to 10 miles radius. If the electric railway is to cover long stretches through thinly settled and consequently unprofitable territory, it will be necessary to adopt higher trolley voltage or abandon the field. Why, some one will ask, can not the power be transmitted by higher pressure alternating currents and transformed down to 550 volts at sub-stations? The simplest answer to this is that commercial reasons in the majority of cases prohibit it. It will be found on calculation, taking into consideration the present prices of machinery and copper, that, in order to make it profitable to transmit from a central steam plant to a sub-station 15 miles distant with step-up, step-down and rotary transformers, the conditions will have to be favorable if the power (including fixed charges) delivered at the sub-station trolley bus is to cost less than if generated by a separate steam plant at the sub-station location. If coal is very cheap ($1.50 a ton or under) and the transmission pressure 10,000 volts, there will be economy in favor of the transmission. With lower voltage and more costly coal the economy begins to disappear and finally appears in favor of the separate steam plant. The advantage in favor of such a transmission is very slight even under the most favorable

conditions, and the investment is necessarily greater than for separate steam plants. It is evident, this being the case, that, unless water power is available, transmission by the plan outlined does not open up an appreciably greater field for the electric railway than is now open to it. To make an important saving and increase the territory served from our power plant it will be necessary to strike out the triple transformation of energy which wastes power and piles up the fixed charges due to heavy investment. The high pressure

EUGENE F. PHILLIPS, PRESIDENT AMERICAN ELECTRICAL WORKS, PROVIDENCE, R. I.

must be taken direct from the trolley. It is not unreasonable to expect that a direct-current voltage as high as 1,000 can be used without serious motor troubles. For longer lines, where higher pressures still are necessary, and where a railroad has its own right of way, multiphase motors, which can safely stand several thousand volts, will probably be used.

Northwestern Electrical Association.

The fourth annual convention of the Northwestern Electrical Association will be held at the Hotel Pfister, Milwaukee, Wis., January 15, 16 and 17, 1896. The programme of the meeting is as follows:

Wednesday, January 15, 9.30 A. M.— Convention convenes. 1. Roll-call. 2. Reading of the minutes. 3. Address of the president. 4. Report of the secretary. 5. Report of the treasurer. 6. Election of officers. 7. Applications for membership. 8. Election of members. 9. Introduction of new members. 10. Report of standing committees. 11. Report of special committees. 12. Miscellaneous business.

Wednesday, January 15, 2 P. M.— "Modern Apparatus and Existing Conditions," by W. C. Buckley. "Economic Expression for Fuel Value," by Arthur Vaughn Abbott.

Thursday, January 16, 9.30 A. M.— "Storage Batteries in Central Stations," by Maurice Barnett. "Some Facts about Acetylene Gas," by John C. McMynn.

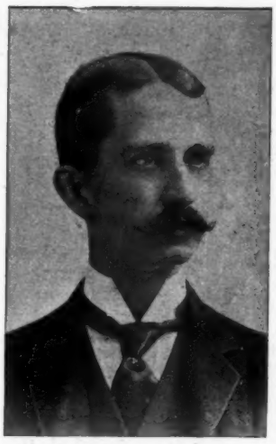
Thursday, January 16, 2 P. M.— "Power Transmission Plants," by E. R. Cunningham. "The Upbuilding of a Small Town," by Fred De Land.

Thursday evening. — Entertainment committee will take care of the guests and programme will be furnished at convention.

Friday, January 17, 9.30 A. M.— No definite programme. Several papers promised for this day.

Rotary Converters at Niagara Falls.

The works of the Pittsburgh Reduction Company have now been in operation at Niagara Falls for several months. The necessary electric current has hitherto been furnished through four of the General Electric Company's 400 K. W. rotary converters, but owing to a considerable increase in the reduction plant they have been found inadequate for the service, and each of these 400 K. W. converters is about to be replaced by one of 600 K. W. capacity. The new machines will be mounted upon the same base frames as the 400 K. W. converters, and thus the converter plant will be increased one-half without any increase in floor space. A fifth converter of 600 K. W. capacity will be installed beside the others and will be similar to them in every respect. The total rotary converter capacity will then be



W. A. HATHAWAY, TREASURER AMERICAN ELECTRICAL WORKS, PROVIDENCE, R. I.

3,000 K. W. Including the transformers installed in the works of the Carborundum Company and the Calcium Carbide Company at Niagara Falls, the General Electric Company will have furnished 5,000 K. W. capacity of transformers for operation in connection with the Cataract Construction Company's system.

A Commutator Chart.

The Forest City Electric Company, of Cleveland, New York and Chicago, has recently gotten out a chart entitled "Divisions of Commutators," for the use of electrical engineers, designers of dynamos and repairmen. This chart gives the degree and angle chord of bars in commutators of from 4 to 375 divisions. One of these charts will be mailed to any person interested upon application to the nearest office. This data has been compiled by Mr. W. B. Cleveland, E. E., the company's general manager.

Balmoral Castle is to be supplied with electric lights. The initial expenditure is estimated at $7,000. Current will be generated by water power from the Gelder, and the ball room of the castle will be the first room to be fitted with electric lights.

THE AMERICAN ELECTRICAL WORKS.

A MAGNIFICENT INSULATED WIRE MANUFACTURING PLANT AT PHILLIPSDALE, R. I. — RAPID GROWTH OF A PROMINENT COMPANY — A PICTORIAL HISTORY OF THE CHANGES OF A QUARTER OF A CENTURY—PERSONNEL OF THE COMPANY.

Everybody in the electrical business knows about the great annual clambakes of the American Electrical Works, held near Providence, R. I., and those members of the fraternity who have not enjoyed the hospitality of Mr. Eugene F. Phillips on those occasions are unfortunate, to say the least.

Every one is not familiar, however, with the immense new plant of the company at Phillipsdale, R. I., near Providence, and those are also unfortunate, as Mr. Phillips' hospitality is not confined to the clambakes. A representative of the ELECTRICAL REVIEW, who dropped in on him last week, can bear testimony to that fact.

That visitors have not, until recently, been very numerous is owing to the location of the establishment, some three miles out of town, and until the opening of the new electric road it has been somewhat difficult of access. Since the completion of the new iron bridge over the Seekonk

W. H. SAWYER, SECRETARY AMERICAN ELECTRICAL WORKS, PROVIDENCE, R. I.

River the tracks have been extended, and a well built line now runs directly to Phillipsdale and within a few hundred feet of the factory.

The property owned by the American Electrical Works, and from whose president the surrounding settlement has taken its name, comprises about 28 acres of land splendidly situated on the banks of the Seekonk River, and between it and the tracks of the Worcester branch of the N. Y., N. H. & H. R. R. Two spurs from the main line enter the factory property, one depositing coal almost at the doors of the boiler room and the other for the shipment of freight. The importance of the latter facility may be estimated from the fact that these shipments sometimes run as high as six cars per day. The water front, which is a very fine one, also offers shipping facilities as well as a means of transportation to and from Providence, Mr. Phillips keeping a steam launch in commission during the Summer for the use of himself and staff.

A glance at the following illustrations should prove interesting. They furnish, as it were, a story without words, but a comprehensive one for all that. The various steps in the development of a great business enterprise are here shown in its steady enlargement from the modest structure of 1870 to the gigantic establishment of the present day.

Twenty-five years ago Mr. Phillips commenced in a very small way the manufacture of insulated wire, his factory being at that time located in a barn in the rear of his residence, at 57 Chestnut street, Providence. A few years sufficed to make these quarters entirely inadequate to the demands of the business, and in 1882 it was incorporated under the name of the American Electrical Works, with Mr. Phillips as president, and under his able management it has grown to be one of the leading industries of the State and one of the largest of its kind in the world, having a capital stock of $750,000 and employing about 1,000 hands.

There are on the property in all 25 buildings, each one used for some special department of the work, and comprising altogether nearly three acres of floor space. In spite of the vast area of space, each floor presents the appearance of a veritable hive of industry, and would make an exceedingly interesting picture. These, however, could not be obtained, for two very good reasons; first, because no camera could do justice to the busy scenes, and, secondly, because, as Mr. Phillips laughingly remarked, "We don't mind letting people know what we do, but we don't care to have them know how we do it."

C. R. REMINGTON, JR., ASSISTANT SECRETARY AMERICAN ELECTRICAL WORKS, PROVIDENCE, R. I.

One of the most interesting of all the departments, and the one which gives the best idea of the immense output of the plant, is the rod mill. Here the copper bars, weighing about 75 pounds each, just as they are received from the mines, are converted into rods averaging three-eighths of an inch in diameter and 500 feet in

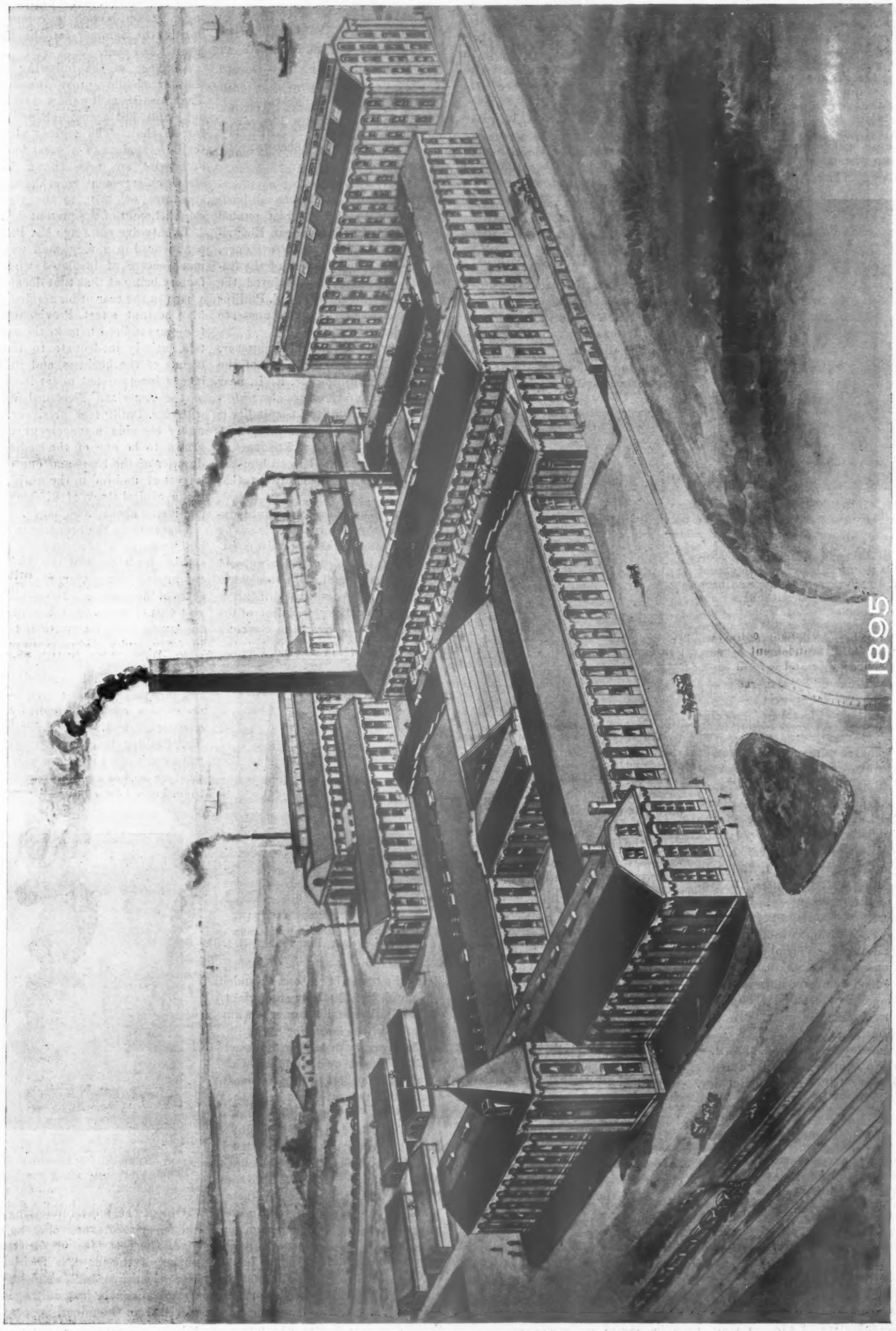


FIG. 5.—THE MAMMOTH NEW PLANT OF THE AMERICAN ELECTRICAL WORKS AT PHILLIPSDALE, NEAR PROVIDENCE, R. I.

length. The capacity of this department is 100,000 pounds per day.

From these rods the copper is drawn into wire of various sizes, from one-half inch to .0015 of an inch, or about one-half the thickness of an ordinary hair. The delicacy of the operation of covering this latter size with silk may readily be imagined, yet it is done successfully.

The boiler room contains fourteen 150 horse-power boilers, which furnish steam at 80 pounds pressure to two 600 horse-power improved Greene engines. These are belted to the main shaft from a flywheel 14 feet in diameter.

The electrical equipment consists of three 250-light incandescent dynamos and one 35 arc light machine. A 250 horse-power Eddy generator is also used for power purposes. The rod mill is operated by rope transmission, 12 ropes, giving 40 horse-power each, running from the main shaft.

Every facility in the way of transportation is afforded the army of employés, those coming from Providence being carried to and fro in a special train. The electric road handles quite a number, and some have settled in the immediate neighborhood of the works, every available house being occupied, and about 50 being accommodated at a boarding-house owned by the company.

It is the intention of the company to build a number of small houses for their employés on property owned by them in Phillipsdale, and work will be commenced on them in the Spring. The site is a good one, on high ground overlooking the river, and within a few minutes' walk of the factory.

One great advantage enjoyed is a splendid water supply. This is taken from a pond near the outlet of Ten Mile River, and is claimed to be the purest water in the State. It is brought into the works at a strong pressure, and is abundant for all uses. Considerable water power could also be developed from the Seekonk River, and it is the ultimate intention to utilize this for lighting purposes.

Communication with the outside world is maintained by a direct wire of the Postal Telegraph Company running into the office building and also by long-distance telephone. The electric road is opening up property along its line in East Providence, and Phillipsdale itself promises to be one of the prettiest villages in the State, having fine natural advantages and well-paid labor.

Associated with Mr. Eugene F. Phillips, and heartily in accord with all his progressive ideas, are W. A. Hathaway, treasurer; Wm. H. Sawyer, secretary, and Chas. R. Remington, Jr., assistant secretary. Mr. Sawyer's connection with Mr. Phillips dates from 1878, at which time he served as superintendent, and at the incorporation of the company he became its secretary. Mr. Hathaway and Mr. Remington joined the company in 1883 and have worked their way up to their present positions. Another well-known and genial personality is that of P. C. Ackerman, manager of the New York house, who dates his connection with the company from 1887. Mr. F. E. Donohoe is in charge of the Chicago house, and both these gentlemen are deservedly popular.

In addition to the home plant, the company have a well-equipped branch factory in Montreal, Canada, known as the Eugene F. Phillips Electrical Works, Limited, which, since its establishment in 1889, has taken a front rank in that territory. Mr. Phillips is also president of this company, which is under the immediate supervision of Mr. John Carroll, who has occupied the position of secretary and treasurer from within a short time of its establishment.

As to the class of goods turned out by the American Electrical Works, they are too well known to require description, comprising everything in the way of insulated wires and cables, from the largest lead-covered cables, for street railway and telephone work, to the finest silk-covered testing wire.

The men at the head of the concern are as well known as the goods they manufacture, and the character of both is beyond reproach.

The electrical industry is indebted to such men and to the products they supply for its unprecedented growth and the perfection of detail which have alone made such development possible.

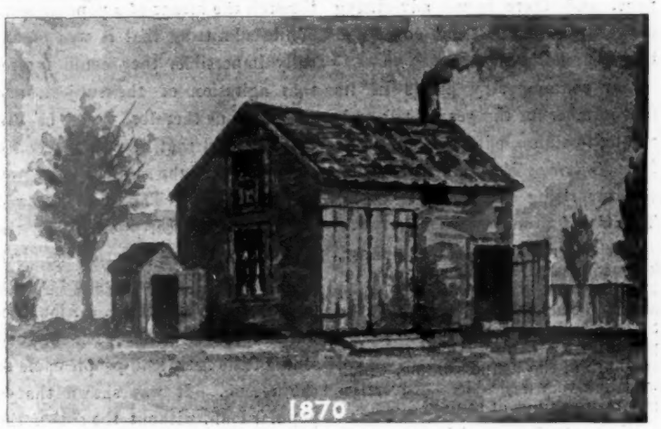


FIG. 1.—THE OLD BARN IN PROVIDENCE, R. I., WHERE EUGENE F. PHILLIPS BEGAN THE MANUFACTURE OF INSULATED WIRE IN 1870.

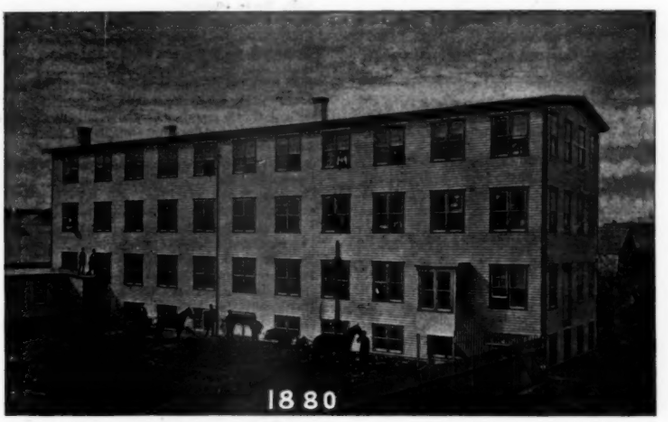


FIG. 2.—THE AMERICAN ELECTRICAL WORKS, PROVIDENCE, R. I., IN 1880.

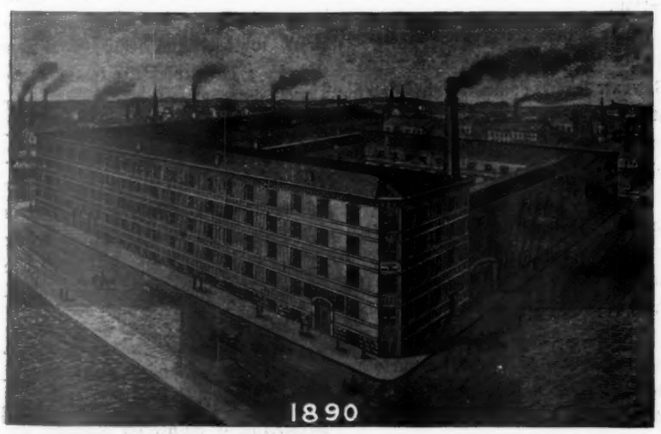


FIG. 3.—THE AMERICAN ELECTRICAL WORKS, PROVIDENCE, R. I., IN 1890.

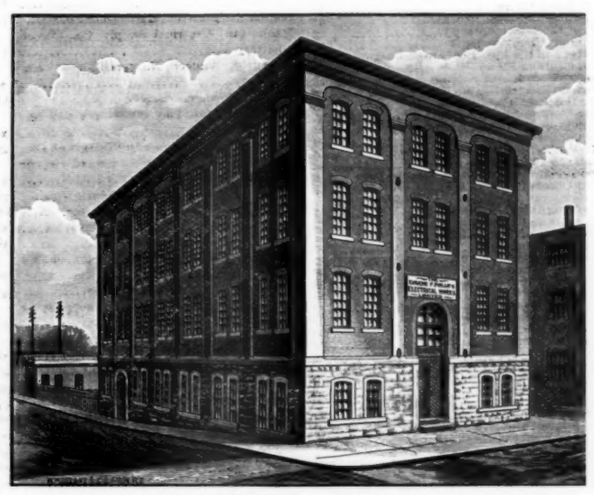


FIG. 4.—EUGENE F. PHILLIPS ELECTRICAL WORKS, LIMITED, MONTREAL, CANADA.

Exports of Electrical Material.

The exports of electrical material by the United States for the four weeks ending November 26, 1895, are given by *International Trade* as follows:

Africa, South, $66; Argentine, $12,584; Australia, $131; Belgium, $9,186; Brazil, $4,134; Central America, $10,137; Chili, $1,882; Colombia, $862; Cuba, $1,785; East Indies, British, $60; Ecuador, $695; England, $8,505; France, $9,722; Germany, $6,926; Guiana, British, $515; Guiana, Dutch, $11; Hayti, 30; Italy, $4,463; Mexico, $18,980; Newfoundland, 500; Nova Scotia, $44; Peru, $735; Porto Rico, $269; Santo Domingo, $285; Venezuela, $4,576; West Indies, British, $3,561; total, $100,644.

The second direct-coupled 800 K. W. monocyclic generator built by the General Electric Company has been started successfully in the St. Louis station. This machine and its brother, which has been operating for some time in that station, are claimed to be the largest generators in the world, so large, indeed, that it was impossible to assemble them at the works before shipment. They are now operating successfully incandescent lamps, arc lights and motors in the city of St. Louis.

The Boston *Journal* says that a new telephone company is preparing to seek admission to Massachusetts, and that rumor connects one of the telegraph companies with it.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, JAN. 15, 1896.

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THE VALUE OF ADVERTISEMENTS.

Our esteemed contemporary, the *American Machinist*, begins the year with many radical changes. A new management is now directing the paper, which has been reduced in size to the standard catalogue dimensions of 9 by 12 inches. The new paper has a sage-green cover, no advertising is carried on the front page, and there is no advertising between the inside front cover and the first reading page.

Our contemporary prints in its first number for the year a two-and-one-half-column editorial on "The New *American Machinist*," in which one surprising statement is made. This is as follows:

The cover will protect the paper, keep it clean and in good shape for binding, and the advertising pages are so attached that they may be taken off when the numbers are to be permanently bound, thus reducing the bulk of the bound volume, which we think very desirable. Advertisements are things of to-day.

We beg to differ. Advertisements are not only "things of to-day," but they are just as much a record of the progress of an industry as are the reading pages of a journal devoted to that industry. The advertisements, cover and all, should be bound with the reading pages in every volume of any journal, if a complete record is desired. That is what bound volumes of a paper are meant to be.

We know of several instances where business houses have received orders from their advertisements two and more years after the journal in which they appeared had suspended publication.

Many times have the advertisements in the files of the ELECTRICAL REVIEW been consulted by patent attorneys in search of evidence as to when certain inventions were first placed upon the market.

The advertiser who pays his good money for space in a paper is entitled to every possible benefit that can accrue to him, either to-day or in the future.

The printed page, both advertising and reading, should be made to last as long as possible, and each constitutes a part of the complete record of the period.

The question has frequently been raised as to what country allows the greatest number of patents for electrical inventions. The latest returns available are those for 1894. Taking three important countries, it is shown that during the year mentioned Great Britain allowed 1,130 patents relating to electricity; Germany allowed 481, and the United States allowed 1,704, or over half the total allowed by the three countries named.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The financial week was ushered in under a cloud of uncertainty. Towards its close the atmosphere had begun to clear and feelings of doubt were replaced by hope. Level-headed financiers feared the result of an attempt to secure $100,000,000 gold for the Treasury from the public, through the means of a popular loan. While admitting that it was practically impossible, they could foresee that agitation of the subject, and preparations therefor, would be disturbing, and that, if they extended far enough, might result in a raid on the gold reserve. The 30 days allowed for popular subscription, when the strained financial situation required immediate relief, was the most serious phase of the situation. Along toward the middle of the week the good sense of the American people came to the rescue. It was shown that a popular loan, without the aid of the banks of New York, Chicago and Philadelphia, was a physical impossibility, as there is not enough gold available. Coupled with this the activity of the Morgan syndicate created the assurance that the bonds would eventually be sold, as was first contemplated by the Secretary of the Treasury, at a price sufficiently low to carry with it a guarantee that the gold reserve would be maintained for a year. This latter belief was the basis of a general covering of short accounts in the stock market and moderate buying for investment. Another factor that improved prices was the less bellicose tone of the English press towards Americans, doubtless due in a large measure to the more serious political complications arising from the Transvaal controversy. London stopped selling our securities. Attracted by the high rates here for money, it was less urgent in demands for remittances. This is the meaning of the small gold movement of the week against the expected heavy shipments.

Electrical securities recovered a part of the previous week's losses. General Electric was unusually active, advancing 3 points on Monday, reacting 3¼ the following day, and on Friday touching 25½, or 3½ points above the low. It was stated in explanation of this movement that there was important buying for long account by the believers in the property, based upon knowledge that further important economies are being introduced in operations. It is said that the year's operations will show about 3 per cent on the common stock after figuring the sums to meet the current interest on the preferred,

interest on debentures and the charging of important amounts to depreciation.

Edison Electric Illuminating of New York failed to rally from its low prices of last week, owing to the continued tightness of money coupled with the discrimination against high-priced, inactive Stock Exchange collateral. One sale was reported at 89 on Monday.

The Edison Company of Brooklyn issued a statement for December, as follows:

	1895.	1894.	Changes.	
Gross earnings	$80,688	$50,260	Inc.	$30,378
Operating expenses	37,016	24,057	Inc.	12,959
Net earnings	43,632	26,204	Inc.	17,418
Taxes	5,200	2,200	Inc.	3,000
Balance	38,432	24,004	Inc.	14,418
Other income	9,386	13,524	Dec.	4,138
Surplus	47,808	36,528	Inc.	11,280

The controversy over the lease of the Edison Company of Philadelphia to the Pennsylvania Heat, Light and Power Company is expected to be terminated at the annual meeting of the former corporation next week. President Marks, who has led the opposition, will, it is said, be replaced by either Director Huey or Director Swain. Following this action the lease will be made.

With the retirement from active business of two of the largest and most aggressive Stock Exchange bear houses we have the passing of the editor of the bear electrical organ. I am constrained by journalistic courtesy to say that coincidence is often more striking than connection.

On the Boston Exchange the telephone stocks were quiet without important change, Bell Telephone at 198, Erie at 61 and New England Telephone at 88. Westinghouse showed a little weakness. The common was 31@31½ and the preferred 52@53. The inactive nature of these securities renders them undesirable as collateral in a tight money market. This is probably the cause of the decline in values. BAIN.

New York, January 11, 1896.

Our tea-green contemporary is running a week behind in getting out, as it generally has been in the matter of news.

And now our chicory-tinted neighbor has been hypnotized or paralyzed by a miscalculated write-up, and has dropped behind a week. The editor who fails to look ahead a little, whether he intends to publish a big story or a lot of free advertisements, can only expect such disaster. These unnecessary delinquencies are in great contrast to our deep-blue contemporary at Chicago, which, although losing its printing office by fire, just as it was going to press, came out only a few hours late with a complete paper.

A good many consolidations and combinations have resulted disastrously in the electrical industry. The carbon agreement is now reported to be tottering. The energy and vitality of the Washington Carbon Company, the Crouse-Tremaine and the Phœnix companies have greatly disturbed this combination, and its members are said to be sorely disgruntled.

CONTEMPORANEOUS VIEWS.

"HOPE DEFERRED MAKETH THE HEART SICK."

[*From the Electric Railway Gazette.*]

Printers' Ink quotes as examples of well written business announcements two of the advertisements inserted in some of the street railway journals by the Standard Air-Brake Company, of 35 Wall street, New York. It says the advertisements "seem to be in dead earnest; don't seem to care whose feelings they hurt among their competitors; seem to have the courage to tell the truth to prospective purchasers." The advertisements of the Standard Air-Brake Company are all written by Mr. E. J. Wessels, the general manager. The *Electric Railway Gazette* has also admired Mr. Wessels' vigorous style in advertising writing—but at a distance. It hopes he will soon insert in the *Gazette* these examples of his handiwork, and then our readers will be able to judge for themselves how characteristically persuasive and convincing they are.

MR. EDISON'S PLEASANTRY TAKEN SERIOUSLY.

[*From London Lightning.*]

In reply to a correspondent, who had asked him his views regarding some alleged statements by Mr. Thomas Alva Edison as to his invention of instruments of destruction for service in war—such as aërial infernal machines, engines throwing water charged with electricity, improved water torpedoes and a gun for the firing of dynamite—Lord Armstrong writes as follows:

CRAGSIDE, ROTHBURY,
December 27, 1895.

Dear Sir: If the words attributed to Mr. Edison are correctly reported—which I greatly doubt—I must say that this great invention is both hard to understand and extravagantly sanguine. Designs which exist only in idea are seldom of much account, and Mr. Edison would be more than human if his brain were capable of evolving matured inventions of astounding potency in war requiring no protracted trials to fit them for practical application. In such matters models and laboratory experiments go for very little on this side of the Atlantic. Nothing short of trials on a scale of actual practice can be relied upon, and these, if made, would from their nature be incapable of concealment, so that the advantage of sole possession would speedily vanish. Transcendent inventions, even when coming from an Edison, should always be received with incredulity in the absence of tangible proof; and Lord Salisbury is himself too much of an electrician to be moved from his serenity by any threats of wholesale electrical destruction which Mr. Edison, in the fervor of his patriotism, may have uttered.

Yours sincerely,
ARMSTRONG.

WHAT WILL BE—AND THE RESULT.

[*From the World's Progress.*]

Electricity will in the near future be made direct from fuel, thus dispensing with engine, boiler and dynamo.

Result: 5,000,000 men now engaged in the manufacture and operation of this mechanism will be compelled to seek new fields and newly created industry.

All forms of cycles will be operated by electric or other kind of motors, and the present recreation form of "biking" will change into an era where their use will be required for business and for travel.

Result: Steam cars for freight and trolley or electric cars for long journeys.

GERMANY'S TELEPHONE SYSTEM.

[*From London Engineering.*]

The telephone system of Germany is rapidly increasing, and a fresh impetus has been given to its further development by Germany's telephonic communication with the neighboring countries. The Berlin-Vienna line is about 420 miles, and the Berlin-Copenhagen line about 500 miles, of which some 20 miles are submarine. In addition to these there are two telephone lines to Belgium. Not less than 434 German towns are in telephonic connection with each other. Berlin now boasts 29,000 instruments; next come Hamburg with 11,000 telephones; Dresden with 4,300, and Leipsic with 4,000.

A Chicago Street Railway Ordinance Passed.

On January 9 the Chicago City Council passed what is known as the "General Electric Railroad" ordinance, giving that company a franchise over 15 miles of streets running south from the heart of the city. The ordinance was amended so as to provide for the payment into the city treasury of one per cent of the gross receipts for the first five years, two per cent for the second five, two and one-half per cent for the third five years and three per cent for the remaining period. This amendment also required the company to keep the streets clear of obstructions "and in a clean and wholesome condition from curb to curb." Amendments requiring that the passengers should have seats, that the fare should be three cents and that the company should pave the streets were defeated.

Insurance on Electric Plants Wanted.

TO THE EDITOR OF ELECTRICAL REVIEW:

Can you send me the name of some responsible electric insurance company making a specialty of placing risks on electric light and power plants? Yours very truly,

C. R. A.

Kansas, January 8.

Demurrer Sustained in a Telephone Suit.

In the suit of the Western Electric Company, representing the American Bell Telephone Company, against the National Telephone Manufacturing Company, of Boston, for infringement of several telephone patents, the defendant filed a demurrer. Judge Colt, of the United States Circuit Court of Appeals, sustained the demurrer at Boston on January 13, because of want of jurisdiction.

The Zinc Smelters' Combination.

A reference was made in last week's ELECTRICAL REVIEW to a combination of zinc smelters, with the object of raising prices and putting the industry on a better-paying basis. The combination includes all the smelters, except four, in Southwestern Missouri and Kansas. The money involved in the deal is $2,000,000.

The world's annual production of zinc is about 330,000 short tons, of 2,000 pounds each. Of this amount the United States produces about 70,000 tons. The zinc business of this country, amounting to about $8,000,000 a year, centers in St. Louis. In the last few years aluminum has become a serious competitor of zinc in the arts, and prices for zinc have declined. It is to meet this situation that the combination of smelters has been formed. It is expected that hereafter the production will be restricted, when necessary, and that as far as possible the expense of manufacture and the profits of middlemen will be curtailed.

The chief use to which zinc is put in the electrical industry is the manufacture of elements for primary batteries. One manufacturing company is said to use about a carload a week and many other concerns use smaller quantities. If the smelters raise the price of zinc, the retail price of battery elements may be expected to be higher.

Mr. T. W. Fisher, of the Illinois Zinc Company, 115 Broadway, New York city, expressed himself on the smelters' combination to an ELECTRICAL REVIEW man as follows:

"For several years the zinc smelters have kept the price of zinc below a living figure, and the talk of a zinc combination is to restore the zinc industry to a better basis. Its consummation, however, is very vague as yet.

"The price up to a few years ago was $5 per 100. For some time it has been $3.25, and since this cold weather set in it has risen to $3.65. The consumption of zinc in the electrical field has greatly increased in the last two years. The Illinois Zinc Company will not enter the combine."

Syracuse Electric Light and Power Company.

The controlling interest in the Syracuse (N. Y.) Electric Light and Power Company has been purchased by the Boston bondholders of the company. The amount of stock purchased from the Syracuse stockholders is said to be about $400,000. The price paid for the stock is reported to be 30. The negotiations were conducted by George W. Davenport.

Those who are said to have disposed of their stock as above are John Dunn, Jr., Manning C. Palmer, Louis Marshall, Bruce S. Aldrich, Paul T. Brady and Robert E. Drake. Stockholders who still retain possession of their holdings are Hamilton S. White, A. J. Belden, A. N. Palmer, C. M. Warner and John Dunfee.

We think Edison has been having some fun with the newspaper reporters. His war stories have a Munchausen flavor.

The Phœnix Interior Telephone Company.

This company, whose factory is at 131 Liberty street, New York, have had a very successful year, and, judging from the orders so far received, the new year promises to be one of unusual activity in the telephone field, and, owing to the efficiency, quality and workmanship of this company's product, they can safely

FIG. 1.—PHŒNIX BLAKE TELEPHONE.

count on a large share of the business. They have recently found it necessary to add new machinery to their already extensive plant to take care of the new business which is "coming their way" in steadily increasing volume.

In addition to their regular Blake transmitters, of which they make and sell a great number, they are now making a granular carbon transmitter, which is claimed to be far superior to anything of the kind now on the market. It is simple in construction, needs no adjustment, and can, therefore, it is claimed, never get out of order. The Blake transmitter is as good a transmitter of speech as can be devised, but it has this drawback, that a person unacquainted with telephones can not always adjust it correctly, and when the Blake is out of adjustment it is practically useless.

Perceiving the demand for a telephone which can be handled by any

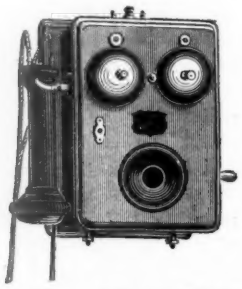


FIG. 2.—PHŒNIX' BLAKE TELEPHONE WITHOUT BATTERY BOX.

one, which needs no adjustment, and which at the same time will not require so much battery power as the carbon transmitters now on the market, they have devised this entirely new granular carbon transmitter, which embodies all these features. It is adjusted in the manufacture and requires no further attention. It is as sensitive as a Blake and as powerful as a solid back, and for ordinary short distances will work perfectly with only one cell of battery. For long distances two or three cells are required.

The cuts shown will illustrate some of their styles of instruments. Fig. 1 is the regular single-battery box, Blake style, telephone. The carbon transmitter can be mounted in the Blake box for those desiring this style of transmitter, in which case two cells of dry battery would be required, as the single-battery box will not hold two wet batteries.

Fig. 2 is the same, as regards talking and ringing qualities, as not only the transmitter is mounted in the same box as the magneto bells, but it has no battery box. This is a very convenient instrument for interior work, or, in fact, any place where no objection is made to placing the batteries in some out-of-the-way place, as under a table or in a closet, etc.

Fig. 3 is designed only for interior work where the distances are short, say, 200 feet or less. This style has a vibrating bell, or "buzzer," instead of the magneto bell, for signaling. The talking quality, however, is the same as the long-distance set.

This company have made a great success of their new inter-communicating switch system, which enables

FIG. 3.—PHŒNIX INTERIOR TELEPHONE.

one station to call up any other of 10 or 20 stations without a central station or operator. This system is fully explained in their illustrated catalogue, which they send free upon request.

Fig. 4 is the long-distance telephone, "par excellence" for exchanges where the very best of everything is desired. It is the regular goose-neck pattern long-distance telephone, with japanned iron arm, nickel-plated transmitter cup, hard-rubber mouth-piece and two-cell battery box, with which the telephone public in the large cities are already so familiar. It is strictly up to date in every particular, and, it is claimed, embodies everything that is best in the telephone art up to the present time.

Fig. 5 is the same as Fig. 4, only the long-distance transmitter is mounted in a Blake pattern box instead of a nickel-plated cup. In every other particular it is the same, and commends itself to many on account of a slight difference in price.

This company send telephones to any reputable dealer or exchange in the country, and all they desire is a trial, as they feel convinced that they have the latest transmitter in the market; and that a trial pair will prove so satisfactory that further orders will surely follow.

This company sell their goods on their merits alone, and do not ask their customers to buy "a pig in a poke;" for any one buying apparatus of them and for any reason being

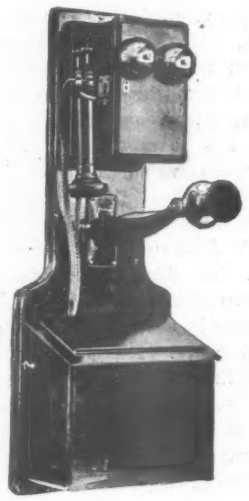


FIG. 4.—PHŒNIX LONG-DISTANCE TELEPHONE.

dissatisfied with their purchase, may, within a reasonable time, return the goods and their money will be cheerfully and promptly refunded. By this method of never trying to force undesirable goods upon their customers, and giving the "money back for the asking," they have made many friends and have an enviable reputation in the trade.

Tubular Conductors.

It is reported that a novel form of conductor will be used in the underground conduit roads to be built in New York city by the Metropolitan Traction Company. Two tubular

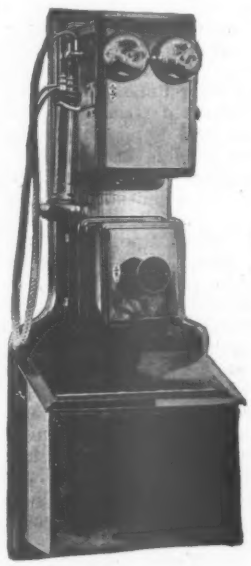


FIG. 5.—PHŒNIX LONG-DISTANCE TELEPHONE, MOUNTED ON BLAKE BOX.

steel conductors, each two inches in diameter and three-tenths of an inch in thickness, will carry a 500-volt current, which will be carried to the motors by brushes running in contact with the tubes.

B. E. Greene Retires from "Electricity."

Mr. B. E. Greene has retired as editor and publisher of *Electricity*, and Messrs. Edward Weston and Charles D. Shain are reported to have assumed the active management of the paper, with Mr. Nelson W. Perry as editor. Professor Weston is the inventor of the Weston incandescent lamp and the well-known electrical measuring instruments bearing his name, and is electrician of the Weston Electrical Instrument Company, of Newark, N. J. Mr. Shain was for several years manager of the Edison General Electric Company's Eastern district office, and lately has been the New York representative of the Weston company and the Siemens & Halske Electric Company of America. Both Messrs. Weston and Shain are credited with having been financially interested in the paper for two years past.

Mr. Greene was connected with several prominent daily newspapers in New York city before he entered electrical journalism. Mr. Greene states that his retirement was due to the desire of Messrs. Weston and Shain to continue and extend the radical policy of the paper in other directions than that in which it had already achieved notoriety. Mr. Greene was not in accord with this idea, hence his retirement. Professor Weston is a man of ability and resources, and the course of his paper will be watched with interest.

Strabismic Headlights.

Col. N. H. Heft, formerly a well-known street railway man of Bridgeport, Conn., and now at the head of the New York, New Haven & Hartford Railroad Company's electrical department, has invented a new kind of headlight, which is being tried on that road, and which would seem to be adaptable to electric railway cars. Colonel Heft's headlight consists of two lamps set "cross-eyed," that is, so that each throws a beam of light across the other's rays. The light on the right-hand side is thrown over to the left and that on the left over to the right. It has been found that this arrangement is of great advantage in throwing a light around a curve. With the two lights set "cross-eyed" it makes no difference which way the curve turns, for one or the other of the headlights illuminates the roadbed.

The Erie Telegraph and Telephone Company.

The earnings of the sub-companies of the Erie Telegraph and Telephone Company for November, 1895, and the 11 months ending December 1, 1895, are shown in the table below:

	Nov. 1895.	Nov. 1894.	Increase.
Gross earnings	$96,672.44	$90,256.88	$6,415.56
Gross expenses	56,605.84	53,706.17	2,810.67
Net earnings	$40,066.60	$36,461.71	$3,604.89
Increase of subscribers	110	101	
	11 Months, 1895.	11 Months, 1894.	Increase.
Gross earnings	$989,653.22	$944,698.55	$44,959.67
Gross expenses	575,111.79	572,543.67	2,568.12
Net earnings	$414,541.43	$372,149.88	$42,391.55
Increase of subscribers	2,254	666	1,588

PERTINENT OBSERVATIONS.—I.

How does it happen that even now so many architects are hopelessly ignorant of the elements of electrical knowledge, at least, so far as is apparent to the naked eye? They make no provision in buildings for the running of wires and seem entirely unacquainted with the primary requirements. They devote much time and attention to new-fangled ideas of various kinds of much less importance, but seem to imagine that the few hours necessary to acquire some rudimentary notions on an art which lends itself so readily to artistic effects, and is so much more convenient in many ways than gas lighting would be, are wasted. We refer, of course, to the majority, while admitting that there are numerous and honorable exceptions. May their tribe increase. The mere making of extracts from and changing the phraseology of the catalogue of a particular firm is not an intelligent drawing of a specification. In New York and Chicago indeed an electrical engineer is frequently called in to advise, and this practice is slowly extending. Nevertheless there are innumerable cases in which the architect, with a very little study, could easily acquire such a familiarity with the main features of the subject as to entirely dispense with outside assistance.

It is remarkable, considering the vast amount of missionary work that has been done during the past 10 years, how the bugaboo of danger from fire from electrical causes still persists. Within a few months a man owning a large cotton mill, after enumerating various reasons for considering kerosene preferable to electric light as an illuminant, said: "And then it's more dangerous, this electricity; you keep on seeing in the papers where it has set places on fire." Yes, less than one-half of one per cent for the past ten years in Massachusetts, where some of the earliest, worst and most parsimonious work was done. But such a man is impregnable to facts.

Even among other and more intelligent people there is an amazing lack of information on electrical subjects. The writer happening to mention to a friend that his house was lighted by electricity, was asked: "Do you use a battery, or do you take it from the arc light circuit?"

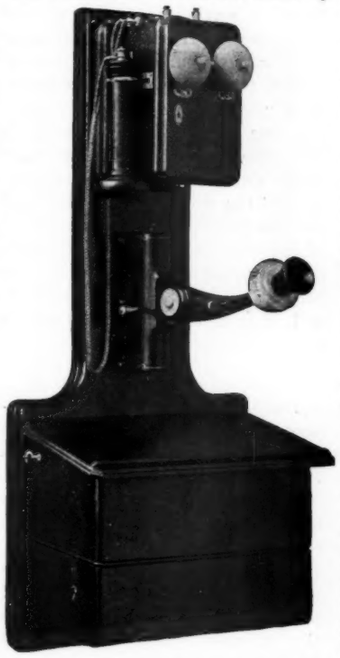
Not long ago a *graduate* of one of our leading technical schools, and one in which electricity is prominently put forward, could hardly be persuaded but that a 110-volt incandescent lamp took twice the current of a 50-volt lamp for the reason that there was twice the voltage. This seems incredible, but it is true.

Apropos of the course now pursued by some municipal authorities of appointing a supervisor or inspector, or other official charged with the duty of examining electric wiring or installations, is it clear that the intended object (a praiseworthy one in itself) is secured by appointing a superintendent of street lights, or the man that looks after the fire-alarm batteries, to such a position? The honest and intelligent contractor scarcely needs supervision, while the man who wishes to "skin" on his work can generally deceive the inspector, except on obvious breaches of the printed underwriters' rules.

J. E. T.

The Connecticut Telephone and Electric Company's Long-Distance Telephone.

The Connecticut Telephone and Electric Company, of Meriden, Conn., are the manufacturers of the telephone set illustrated herewith, which is known as their Outfit No. 7. The chief claims of merit made by



THE CONNECTICUT TELEPHONE AND ELECTRIC COMPANY'S LONG-DISTANCE TELEPHONE.

the manufacturers are as follows: Simplicity of construction, no adjustment required, impossibility of "packing" under any condition, sensitiveness and clearness of articulation, least amount of induction effect and indestructibility.

This is but one of several types of telephone instruments made by the above company.

Search-Lights and Mythology.

A commission has been appointed for the purpose of studying the question of illuminating the Hellespont with the electric light, says the New York *Sun*. It is no romantic substitute for poor Hero's lamp, but Leander might have lived to a good old age if he had only had the benefit of it. And the fair Helle herself, who gave her name to the since somewhat well-known piece of water, might have been able to pick up a life preserver if the sea had been properly lighted, and so have escaped a wet death and immortality.

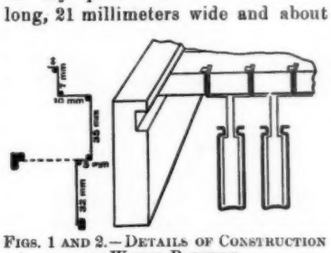
The new telephone line between Middleburg, N. Y., and Central Bridge, along the railroad, is completed.

ON A NEW FORM OF WATER BATTERY.

BY LOUIS W. AUSTIN AND CHARLES B. THWING IN THE "PHYSICAL REVIEW."

The ordinary old form of water battery, consisting of zinc-copper couples dipping in short test tubes set in paraffine, while perfectly satisfactory in its workings, is extremely inconvenient to fill as soon as a large number of cells are used, since each cell must be filled separately and with great care lest the insulating medium should be wetted. Some years ago Professor Rowland* proposed a battery, very convenient for many purposes, which consisted of a series of zinc-copper pairs cemented to the lower side of a glass plate, each pair being so near to the next that when the tips of the metal strips have been dipped in water a drop is held between each strip and the adjacent one of the opposite metal in the next pair by capillary action. This drop will evaporate in about half an hour, when, of course, the battery must be dipped again. If for any reason it is desired to keep up the potential undisturbed for a longer time than this, some other battery must be used.

The battery about to be described is one designed by the authors for use in some electrometer work on which they were engaged. It has proved so satisfactory and convenient in its working that we have decided to describe it for the benefit of other physicists. It is constructed as follows: The required number of zincs and coppers are cut and bent by means of a form made by driving small nails into a block of wood in the shape shown in Fig. 1. The zinc strips differ from the copper ones only in having the short bent portion at the top (*t*, Fig. 1) omitted. Cuts 4 millimeters deep and 28 millimeters apart are then sawed in strips of dry pine wood 34 centimeters long, 21 millimeters wide and about



FIGS. 1 AND 2.—DETAILS OF CONSTRUCTION OF WATER BATTERY.

7 millimeters thick. The zinc and copper pairs are then soldered together and slipped into the cuts, after which 10 strips are mounted together, with the addition of a blank strip to hold the last line of metal pairs in place in the grooved end pieces, and fastened firmly with nails. To secure perfect insulation, the wooden portions are next dipped for a few moments in a pan containing shellac varnish. The battery is completed by springing a one-drachm homeopathic vial over each pair, the metal strips being so placed that they hold the bottles in position without any other support. The battery is filled by setting it over a pan (30 centimeters by 30 centimeters and 9 centimeters deep) filled with water. The general appearance of one of the frames is shown in Fig. 2. In our battery 10 such frames of 100 cells each are placed four deep in a portable rack of wood. A battery of this sort, while it can be filled almost as easily as Rowland's, can be used without refilling for several weeks.

THE PHYSICAL LABORATORY OF THE UNIVERSITY OF WISCONSIN, August, 1895.

*Philosophical Magazine, March, 1887, p. 308.

A Wonderful Light.

The following special cable dispatch was sent from London to the New York *Sun* on January 6:

The noise of war's alarms should not distract attention from the marvelous triumph of science which is reported from Vienna. It is announced that Professor Routgen, of the Würzburg University, has discovered a light which, for the purposes of photography, will penetrate wood, flesh and most other organic substances. The professor has succeeded in photographing metal weights which were in a closed wooden case; also a man's hand, which shows only the bones, the flesh being invisible.

The *Chronicle* correspondent says the discovery is simple. The professor takes a so-called Crooke's pipe, viz., a vacuum glass pipe with an induction current going through it, and, by means of rays which the pipe emits, photographs on ordinary photographic plates.

"In contrast with the ordinary rays of light, these rays penetrate organic matter and other opaque substances just as ordinary rays penetrate glass."

He has also succeeded in photographing hidden metals with a cloth thrown over the camera. The rays penetrated not only the wooden case containing the metals, but the fabric in front of the negative.

The professor is already using his discovery to photograph broken limbs and bullets in human bodies.

OUR CANADIAN LETTER.

HULL, QUE.—The Council can not establish an electric light plant as the franchise granted to Thos. Niau covers the privilege.

ROSSLAND, B. C.—F. M. McLeod has given notice of application to incorporate a company to operate electric light and waterworks.

QUEBEC, QUE.—The Quebec & Montmorency Electric Power Company is considering a proposal to light public buildings in Lewis and to convey the electric current across the St. Lawrence for the purpose by means of a cable laid at the bottom of the river.

MILLBROOK, ONT.—Millbrook Electric Light Company, incorporated; capital, $6,200. To carry on general lighting business.

FRASERVILLE, QUE. — Fraserville Electric Power Company applied for incorporation; capital, $25,000. To operate telephone lines, electric light plants, etc.

MONTREAL, QUE.—Northern Electric and Manufacturing Company, incorporated; capital stock, $50,000. To manufacture brass, copper, etc.

J. A. C.

Montreal, January 10, 1896.

TELEPHONE NEWS AND COMMENT.

The Octoraro Telephone and Telegraph Company is engaged in building a local telephone line at Oxford, Pa. Mr. Eli McKissick is secretary of the company.

In the Standard Dictionary Alexander Graham Bell is named as the inventor of the telephone and Edison and Gilliland as the joint inventors of the transmitter. Both devices are illustrated.

The annual meeting of the stockholders of the Missouri & Kansas Telephone Company will be held in Kansas City, Mo., on January 22. A board of nine directors will be elected for the ensuing year, the by-laws will be amended and other business transacted.

It is reported that an American engineer is installing a telephone line between Reykyavik and Akureyri, Iceland, at an estimated cost of 100,000 kr. The Icelandic conversation over the line will, it is thought, be something truely lovely, especially the part that isn't frozen.

The Orange, N. J., Common Council, the East Orange Township Committee and the South Orange Village Board of Trustees are considering ordinances granting to the New York & New Jersey Telephone Company the right to construct underground conduits for its wires.

The establishing of the Home Telephone Company's new exchange in Mobile, Ala., has resulted in a reduction of rates by the Southern Bell Telephone Company in Mobile. The prices for Bell instruments are now $12 and $20 a year for residence and business telephones, respectively.

The Orange, N. J., Telephone Company has applied for a franchise in East Orange, and will present similar proposals to the governing bodies of the other Oranges. It is understood that the Orange Telephone Company will act in harmony with the Newark Telephone Company, recently incorporated.

The Kansas City, Mo., Board of Trade has appointed J. O. Bradenbaugh, George E. Thayer and E. D. Fisher a committee to discuss the matter of telephone rates with similar committees to be appointed by the Real Estate Exchange, the Live Stock Exchange, the Commercial Club, Produce Dealers' Exchange and the Builders' and Traders' Exchange.

The New England Telephone and Telegraph Company is replacing its old lines through Turner's Falls, Mass., with new poles and metallic circuits. The company now has 25 subscribers in Turner's Falls. At Shelburne Falls a public office is to be placed in the office of the Shelburne Falls House, and the arrangements are such that communications can be made with the village nights and Sundays, which have been impossible heretofore.

It is probable that the train dispatcher on the New York & Brooklyn Bridge will soon direct the movements of bridge trains by telephone. Experiments are now being made. Under the proposed system metallic circuits will be used. The dispatcher will sit in his office wearing a head telephone, such as is used by the "central" girl, and a long-distance transmitter will be at his desk. At the front and end of each train in service a telephone will be placed. In foggy weather the gripmen will wear a telephone receiver as a headpiece, so that they can respond instantly if called up by the dispatcher.

Employés of the Pennsylvania Railroad and a construction gang working for the Interstate Telephone and Telegraph Company recently had an encounter near Frederick, Md. In building an extension of the telephone company's lines it was necessary to cross the railroad company's tracks and telegraph lines, to which objection was made. The telephone wires were several times strung 10 feet above above the telegraph lines, but were as often cut. Finally a fight between the employés of the two companies took place, and after that the telephone company secured an injunction restraining the railroad company from interfering with its wires.

The official statistics of the development of telephony in Austria just published by the London *Electrician* show the following figures for the year 1894. Figures printed in parentheses refer to 1893: The total number of telephones was 17,404 (14,941); of these the State controlled 9,295 (7,850), and a private company 8,109 (7,071). There were 121 (85) town systems with 8,365 (7,280) miles of conductor, 47 (40) interurban lines with 5,246 (4,155) miles of conductor, 112 (86) exchanges, 210 (177) public call offices, 8,723 (7,499) subscribers, and 223 (155) switchboards under State control. In private hands there was only the Vienna exchange, with 26,443 (26,170) miles of conductor, and one other exchange, 16 public call offices, 7,924 (6,102) subscribers, and 168 (152) switchboards.

F. H. Brown, of Emporia, Kas., was recently in St. Louis and talked as follows about telephone progress in the southwest: "Girard, Pittsburg, Galena, Independence, Neodesha, Coffeyville and other Kansas towns have telephone plants, and I am now busy on plants in Parsons and Oswego. The cities are to be connected. In Missouri there are Joplin, Carthage, Webb City, Carterville and Lamar. What is the cost for subscribers? It varies from about $12 to $30. My charges at Parsons are to be $24 a year for business houses and $12 for residences. At Girard they have three rates—$18 for residences, $24 for offices and $30 for stores. In Joplin and Carthage subscribers pay $30 for business-house and $15 for residence telephones. I think $18 and $30 about the average for all that part of the country."

According to a German contemporary, experiments with favorable results connecting the guardship "Heinedal," lying in the harbor of Kiel, with the shore have been made. It is expected that it will now be possible for all the ships that lie near a buoy in Kiel harbor to be connected by telephone, not only with the telephone system of the city, but also with the other ships in the harbor. The central office of the ship telephone system is in the torpedo depot. From a small temporary wooden building wires run through the water to the same buoy, so that the connection is thus made without trouble. If a vessel leaves its buoy it disconnects the wire from the ship's telephone, and if it approaches one, it makes connection. The communication of the ship with the different port authorities and with purveyors of provisions, hitherto attended with inconvenience and delay, has by this innovation been greatly facilitated, and it is also of noteworthy use for signaling purposes.

The Colorado Automatic Telephone Company, located at Colorado Springs, has just secured a franchise for telephone purposes in that city. Six telephones are to be furnished to the city and as many more at half-rates as may be required by the City Council. The company has 30 days in which to accept the resolution and nine months in which to complete the exchange. They will not put wires in conduits until all companies are compelled to do so by the City Council. The life of the resolution is 20 years. Rates are to be $30 for residences and $40 for places of business. Long-distance copper metallic circuit instruments will be used in connection with Strowger automatic telephone exchange switches. Construction will commence immediately. The completed exchange, it is claimed, will start with about 500 subscribers, double the number now using Bell instruments. Nearly that many three-year contracts have already been secured. The company's president, James F. Burns, and three of its directors own a controlling interest in the famous Portland Gold Mine, the largest producing mining property in all Cripple Creek. It is claimed, on very good authority, that "Jim" has a snug daily income of $4,000, not counting out "rainy days" or Sundays.

The history of the Central Union Telephone Company's franchise in Indianapolis, Ind., is given as follows by the *News* of that city: An ordinance granting the Indiana District Telephone Company certain rights went into effect in 1879, with a section reserving the right to repeal. A concurrent resolution was passed by the Council and Board of Aldermen in 1883 granting to the Central Union company, the successor of the Indiana District Telephone, the authority to use certain streets for poles, and providing that poles should be set in accordance with provisions of the original ordinance of the Indiana District company. The ordinance granting rights to the Indiana District company was declared repealed by an ordinance passed on April 12, 1886. On the same date a concurrent resolution of the Council and Board of Aldermen was passed, declaring that all resolutions granting rights to the Central Union Telephone Company were repealed. On April 16 resolutions were passed ordering the Central Union company to take down its fixtures, and ordering the street commissioner to remove them if they were not taken down within 14 days. On May 24, 1886, a petition from citizens that the company be not compelled to remove its appliances until a new company should secure a franchise was granted. On March 28, 1887, a resolution was adopted authorizing the company to maintain the poles and wires it then had and add poles and wires needed, under the direction of the city engineer.

Standard Rules for Electrical Construction.

The committee on standard rules for electrical construction and operation of the National Electric Light Association issued a call several months ago inviting the American Institute of Electrical Engineers, the American Street Railway Association, the National Board of Fire Underwriters, the International Fire Chiefs' Association, the American Institute of Architects, the American Bell Telephone Company, the Western Union Telegraph Company, the Postal Telegraph Company, the General Electric Company and the Westinghouse Electric and Manufacturing Company to co-operate with their committee in the formation of a joint committee to consider generally the subject of electrical rules, with a view of securing the promulgation and enforcement of one standard set of rules for electrical construction and operation, and which set of rules would meet with the hearty approval of the various allied interests, above referred to, as well as the world at large.

A call for this joint meeting was issued for January 18, 1896. It was subsequently deemed desirable, in view of the short amount of time in which to secure the co-operation of the various interests invited, as well as to do certain preliminary work prior to said meeting, that the date of the meeting be postponed until March 18, 1896, and notice of this change in the date has been sent to each of the parties. Nearly all the parties interested have notified Mr. W. J. Hammer, chairman of the committee, that they have accepted the invitation and appointed delegates to attend the meeting.

ELECTRIC RAILWAY NOTES.

Work was commenced on January 8 on the steel trestle which is to carry the trolley road between Jersey City, N. J., and Newark over the Delaware, Lackawanna & Western tracks at Sandford's crossing, on the Newark and Jersey City turnpike. It is to be 900 feet long and will have 21 feet clear headroom. The cost is estimated at $25,000, and the contract calls for completion by April 1.

Application has been made to the Board of Railroad Commissioners of the State of New York by the Metropolitan Street Railway Company for the approval of the board of the use of an underground current of electricity for the operation of cars upon Lexington avenue between 105th street and the Harlem River, New York city, and by the Metropolitan Street Railway Company and the Twenty-third Street Railway Company for the approval of the board of the use of an underground current of electricity for the operation of cars on Twenty-third street between the East River and North River.

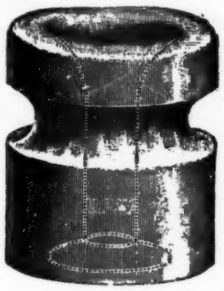
The Metropolitan Street Railway, of Kansas City, Mo., is capitalized at $5,600,000. C. F. Morse is president; W. H. Holmes, vice-president and general manager; and C. F. Holmes, general superintendent. The system includes 136 miles of track, divided as follows: Cable, 62½ miles; electric, 60½ miles; horse, 13 miles. So Kansas City is not so exclusively a cable city as many suppose. This company controls the entire street railway traffic of Kansas City and suburbs, with the exception of two small lines, one electric and the other cable, which, rumor has it, it will absorb at no distant date. The company operates a liberal transfer system, between 50,000 and 60,000 transfers being issued every day.

Street railway law in Connecticut provides that the decision of the Superior Court or Superior Court judge, on appeal from municipal provisions for new street railways, "shall be final and conclusive upon the parties." In the New Britain trolley taxation case arising from the attempt of that city to impose a tax on the gross receipts of the local trolley company as the condition of its extension of lines through three streets, the Supreme Court sweepingly overrules this point, holding that the right of appeal is a constitutional one. The effect of this will be to prolong considerably litigation under the street railroad law in Connecticut, and to subject findings of the Superior Courts to review by the court of last resort.

It is expected the work on the new electric railroad between Patchogue, L. I., and Port Jefferson will be commenced soon. This will be only the beginning of several miles of construction of electric roads, as a movement is now on foot to parallel the Long Island Railroad from Patchogue as far west as Babylon, and from which point it is expected a Brooklyn company will take up the line, running through all the principal villages on the south shore of Long Island. These lines, when completed, will be a great boon to Long Island, as it will bring New York and Connecticut within easy access of "the garden spot of America" at a small cost. Several prominent men are interested in promoting the enterpise, among them being ex-County Clerk O. T. Fanning, of Riverhead, and others. J. B. Swezey, Patchogue, L. I., is at present acting as secretary of the Cross-Island Trolley Company.

A New Line of Insulators and Tubings.

The Akron Insulator and Marble Company, of Akron, Ohio, are introducing to the electrical field a line of insulators which they say are in advance of anything yet produced. The material used is simply earth without any chemicals or metallic oxides, fused at 4,000 degrees of heat. The advantages claimed are that it is a perfect insulator, which is vitreous and does not absorb moisture, and is extremely strong.



FIGS. 1 AND 2.—TYPES OF AKRON INSULATOR.

The Gordon Primary Battery.

The accompanying illustrations show the exterior and interior of the Gordon primary battery, manufactured by the Gordon-Burnham Battery Company, 82 West Broadway, New York city. The chief claims of superiority made for this battery, and which, it is said, are supported by expert testimony and practical demonstrations, are as follows:

Long life—Warranted to operate, at a discharge rate of eight or ten one-hundredths of an ampere, six months without any attention whatever, as required for railway signal service, and much longer where less power is required.

Efficiency—It will perform many kinds of work that can not be obtained from the gravity battery.

Economy—The installations and maintenance of the Gordon battery for one year for railway signal service is about one-half the cost of the gravity battery.

Adaptability—The Gordon battery will work equally well on either open or closed circuit.

It is absolutely non-freezing—In practical operation in railway signal service the Gordon battery on the surface of the ground has worked uninterruptedly with the mercury four degrees below zero. Gravity batteries, eight feet under ground, at the same time, froze solid.

Labor saving—It requires no supervision whatever during its life.

Free from local action—It is not consumed by local action when not in service. Gravity batteries require constant attention and "feeding," whether in use or not, while the Gordon battery is not a self-consumer, all its elements remaining intact until required to produce power.

Freedom from gases and odors—It is clean and neat in appearance and absolutely free from noxious fumes and gases and from "creeping salts."

Superior generator of energy—Its product in useful energy is four times greater, weight for weight, than the gravity battery.

FIG. 1.—THE GORDON PRIMARY BATTERY.

FIG. 2.—INTERIOR CONSTRUCTION OF GORDON PRIMARY BATTERY.

The New York Central & Hudson River Railroad, among other large corporations, has indorsed the Gordon battery.

The Hammond, Whiting & East Chicago Electric Railway is reported to have been sold to the South Chicago Electric Railway Company for $500,000.

Telephone Contracts.

The decision of Judge Carpenter on telephone contracts, handed down in the Circuit Court at Detroit on January 3, was referred to in the ELECTRICAL REVIEW last week. The case was that of Henry C. Wisner against the Michigan Bell Telephone Company. The plaintiff applied to have a telephone installed in his residence, but the company refused to do so until he signed a contract. Mr. Wisner did not like the conditions of the contract and offered to pay a year's rental in advance. The company insisted on a contract being signed, so Mr. Wisner applied for a mandamus, which the court issued, all the judges concurring. Judge Carpenter's opinion declares the contract which the company attempts to compel its subscribers to sign is an unreasonable and unfair one, and it says that it is the province of the legislative department of the city government to fix the future rates which shall govern the business of the telephone company. The opinion reads in part as follows:

"The telephone company is engaged in a public business. It has been permitted to occupy the streets of the city of Detroit and to furnish service of a public nature to the entire community. It can not, however, as can an individual engaged in a business of private concern, determine with whom, how or on what terms it will do its business. Organized to deal with the public, enjoying a public franchise, engaged in performing a duty of a public character like railroad companies, express companies and telegraph companies, it owes such a duty to the public that some branch of the legislative department of the government may regulate its business and its charges. In the absence of such regulations it can not insist upon unreasonable conditions or unreasonable charges, and if it refuses to furnish telephonic service to one who is entitled to it, a remedy by mandamus is a proper one.

"The proposed contract restricts the use of said telephone to relator and his employés. The language, 'he shall not extend this use to other individuals except his employés,' clearly indicates that except in the contingency of relator's wife and children being his employés, they have no right to use his telephone. It is clearly unreasonable to compel relator to procure several telephones to perform the service which can be performed by one. This provision is, therefore, in our judgment, unreasonable."

John Kerr was driving through a Perth Amboy, N. J., street on July 26, 1895, when a telephone wire fell upon his horse, causing the animal to run away. Mr. Kerr was thrown from the vehicle and sustained such injuries as induced him to bring a suit against the New York & New Jersey Telephone Company for $15,000 damages. A jury in the United States Circuit Court, in New New York city, has awarded him $400.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

Electric Light and Power.

KANSAS CITY, MO.—The Southwestern Light Company has applied for articles of incorporation. The petitioners are officials of the Missouri, Kansas & Texas Trust Company. They are A. E. Stilwell, G. L. Martin, George M. Meyers, J. McD. Trimble and Charles A. Braley. The company is to take the place of two companies in adjoining towns in Southern Missouri. They are to go out of existence, and the new company is to take up their business—the manufacture of electric lights. Capital stock $300,000.

JACKSON, TENN.—The City Council has contracted with the Jackson & Suburban Street Railway Company for an electric light plant.

WASHINGTON, D. C.—A bill has been introduced in Congress to incorporate the National Capital Gas Light, Heat and Power Company of the District of Columbia. The incorporators are Chas. D. Hauk, Francis P. B. Sands and others. Capital stock is not to exceed $2,000,000.

GRAND RAPIDS, MICH.—Peninsular Light and Power Company, John E. Moore, Lowell corporation, had a hearing before the committee on streets relative to that company's request for right of way for poles in business portions of the city.

KANSAS CITY, KAS. — The Consolidated Electric Light and Power Company has filed an injunction to prevent the payment of a light bill by the city to H. D. Knipfer & Son.

PALATKA, FLA.—The Palatka Gas Light and Fuel Company has put in a 1,000 light dynamo.

SMITHVILLE, TEX.—The Smithville Town Company will erect an electric light plant. Want plans and bids on same.

SHEFFIELD, ALA.—The Consolidated Water and Electric Light and Power Company has been incorporated with E. F. Enslen, of Birmingham, president, and C. B. Ashe, of Sheffield, secretary and treasurer. Capital stock $250,000.

BLACKSTONE, MASS.—This place is soon to be lighted by electricity and to have electric power. A company has been formed with a capital of $10,000, and has been granted a charter by the commonwealth to construct and maintain a plant to furnish electric lights and power to the town. The president is Robert B. Taber and the treasurer is Jeremiah Getchell. The directors are John G. Getchell, Robert B. Taber and Jeremiah Getchell.

ARCADIA, WIS.—A 10-year franchise was given to the Arcadia Milling Company to wire the city streets for electric lights. The company expects to have the system in working order by February 1.

DEPEW, N. Y.—A franchise has been applied for by a number of the strongest financial men in Buffalo for an electric light and power and gas plant, and it is probable that not less than $25,000 will be expended next summer.

CRESTON, IOWA.—The city of Bedford has voted a 15 year franchise for an electric plant.

LADONIA, TEX.—Ladonia Electric Light Company has been incorporated by T. V. Richards, J. W. Nail, D. E. Wagoner and J. A. Jackson. Capital stock, $10,000.

HERINGTON, KAS.—Water, Light and Power Company has been incorporated by J. S. Brundage, H. S. J. Towner, T. N. Bixby, P. G. Dayton and R. A. Wilson. Capital stock, $30,000.

New Electric Railways.

NEW HAVEN, CONN.—The Middletown Electric Railway Company will build a combined car and powerhouse.

ANACOSTIA, D. C.—A. E. Randle and others are interested in the proposed electric line from Congress Heights to Lincoln Square, Washington, which, if constructed, will be an underground system.

JACKSON, TENN.—The Jackson Street Railway Company is making arrangements to construct its trolley line.

CHARLESTON, S. C.—Julian Fishburne and others have asked for franchise to construct an electric line in this city.

COLUMBUS, GA.—The Columbus Railroad Company will enlarge its plant at a cost of $50,000.

SCRANTON, PA.—The Latrobe & Ligonier Electric Street Railway Company, of Westmoreland county, has been chartered. The road will be twelve miles in length and the route will be from Loyalhanna Creek through the township of Unity and the boroughs of Youngstown and Ligonier. The capital stock is $72,000. Edward E. Robbins, of Greensburg, is president of the company.

HARRISBURG, PA.—The Harrisburg Construction Company, which has been awarded the contract to build the Hagerstown Electric Railroad, has purchased the plant of the Martinsburg Street Railway Company for $10,000. The material will be used in the construction of the Funkstown and Leitersburg extension of the proposed road.

WAKEFIELD, R. I. — William C. Clark, of this place, it is reported, will begin the construction of the new electric line from Watch Hill to Narragansett Pier, R. I., by way of Point Judith, early in February. The road will be 39 miles long and will follow the beach the entire distance.

JENKINTOWN, PA.—Plans are being drawn for an extension of the Old York (Pa.) trolley line through Jenkintown, and the Wharton Railroad Switch Company property to the Willow Grove pike, and from there to Glenside.

PITTSTON, PA.—People's Electric Railway Company proposes to construct an electric railway eight miles in length between this place and Wilkesbarre.

CHICAGO, ILL.—Brainard Traction, Light and Power Company, has been incorporated; capital stock, $300,000; incorporators, John G. Campbell, Edward C. Elliott and William Brace.

CHICAGO, ILL.—Rockford Traction Company has been incorporated; capital stock, $300,000; incorporators, C. Harry Moore, Harry L. Jewell and William Foster Burns.

SARATOGA, CAL.—F. M. Farwell and H. W. Postlethwaite, of Saratoga, are interested in the proposed electric road from Mayfield to Saratoga, for which subscriptions are now being taken.

MIDDLETOWN, CONN.—The Middletown Street Railway Company, which is controlled by the syndicate that owns the Winchester avenue system of New Haven, Conn., has completed the purchase of the Portland Street Railway, and the two roads are to be consolidated.

HAMMOND, IND.—The Hammond, East Chicago & Whiting Street Railroad has been sold to Columbus R. Cummings, of the South Chicago Street Railroad Company.

PITTSFIELD, MASS.—The Pittsfield Electric Street Railway Company has filed a petition at the State House, asking for authority to extend its line in and through the town of Dalton and to issue additional stock and bonds to an amount not exceeding $75,000 each.

EAST BRAINTREE, MASS.—The Weymouth & Braintree Street Railway Company is to erect at once on Allen street a power-house 45 feet by 100 feet. The company will put in three 300 horse-power boilers and two 150 horse-power engines.

DANBURY, CONN.—A new trolley road is to be built connecting this place with Golden's Bridge and the Harlem Railroad. The new line will be 14 miles in length. F. F. Wardwell, of the firm of Wardwell Bros., builders of electric roads, is the principal stockholder. The construction of the road will begin soon.

New Telephone and Telegraph Companies.

TROY, MO.—Captain T. R. Reed is organizing a company to establish a telephone line between this place and Elsberry, via New Hope, Auburn, Okete and Brussels. The total distance is about 25 miles.

HELENA, MONT.—Prominent citizens have organized the Rocky Mountain Postal Telegraph Company, to purchase the plant of the old Rocky Mountain Telegraph Company, which has been operating for several years in Montana, and will extend its lines to Ogden, Salt Lake and Denver. A contract has been made with the Postal Telegraph Company for connections at Spokane, Denver and Cheyenne. Bonds to the amount of $400,000 will be floated for the work of construction.

HARTFORD, CONN.—The telephone service has been extended to East and North Granby, Tariffville, Canton, Avon, Weatogue, Simsbury and Collinsville, with a central office in the Simsbury railroad station.

CHARLESTON, S. C.—The Carolina Mutual Telephone and Telegraph Company has been incorporated with E. M. Bailey, president; Moultrie Mordecai, vice-president, and R. B. Lebby, secretary and treasurer. Capital stock, $30,000.

STRONGHURST, ILL. — Henderson County Telephone Company has been incorporated; capital stock, $2,500; operate telephone exchanges; incorporators, J. O. Anderson, J. F. Mains, Orin L. Dunsworth, T. J. Hunter, E. H. Allison, E. B. Campbell, L. M. Loomis.

NORTHFIELD, VT.—W. E. Nichols is agitating a local telephone exchange to take in this village and a radius of about two miles.

COMANCHE, TEX.—Work is to commence soon on a 10-mile telephone line to Newburg.

GEORGETOWN, KY. — The Long-Distance Telephone Company has opened an office at this place.

COEYMANS, N. Y.—Coeymans & Westerlo Telephone Company, to operate a telephone line from this place to Dormansville, town of Westerlo, Albany county, and intermediate points. Capital stock, $850.

New Manufacturing Companies.

NEW YORK, N. Y.—Chapin-Douglas Electric Company has been formed, with Charles E. Chapin, president; J. S. Douglas, secretary and treasurer; for the manufacture of electrical supplies, 136 Liberty street.

WINTER HARBOR, ME.—Electro-Stereo-Cosmorama Company has been incorporated, with C. C. Larrabeom, president; Bedford E. Tracey, treasurer; to manufacture, exhibit and deal in stereo-cosmorama machines. Capital stock, $50,000.

Business Troubles.

CHICAGO, ILL.—C. E. Woods Company, electrical supplies, has made an assignment.

TRENTON, N. J.—John Thompson has been appointed receiver of the Brigantine Transit Company, a trolley road from Atlantic City to Brigantine Beach.

Increase of Capital Stock.

DIGHTON, MASS.—The Dighton, Somerset & Swanzey Street Railway Company has increased its capital stock by $65,000. This makes the total capital $125,000. The president of the company is Bradford D. Davol.

LITERARY.

Lovers of bicycling will find a story to their taste in the February *Scribner's*. It is entitled "A Long Chase," and describes a race across the snow between a man on a bicycle and a pack of angry wolves.

The New Year's number of the *Inland Printer* contains some splendid half-tone work and the usual amount of interesting reading matter displayed with typographical excellence. The cover design by Bradley is one of those weird creations which may mean many things except to those within the charmed circle.

No one ever thought of introducing so expensive a feature as lithographic color work in the days when the leading magazines sold for $4 a year and 35 cents a copy. But times change, and the magazines change with them. It has remained for the *Cosmopolitan*, sold at $1 a year, to put in an extensive lithographic plant capable of printing 320,000 pages per day (one color). The January issue presents as a frontispiece a water-color drawing by Eric Pape, illustrating the last story by Robert Louis Stevenson, which has probably never been excelled even in the pages of the finest dollar French periodicals. The cover of the *Cosmopolitan* is also changed, a drawing of page length, by the famous Paris artist Rossi, in lithographic colors on white paper, takes the place of the manilla back with its red stripe. Hereafter the cover is to be a fresh surprise each month.

Messrs. G. Masson, of Paris, have just issued a little blue-book which will be highly appreciated by all practical electricians. It is a collection of workshop receipts made by the French Nestor of electrical science, M. Hospitalier, professor at the École de Physique et de Chimie, Paris. The little volume, which is exceedingly well arranged and abundantly illustrated, can not fail to be useful to American electricians, because it contains a number of receipts that do not appear in any of the standard collections which have been published in the United States. All the old and well-worn receipts have been carefully eliminated, and the student gets the result of the latest available knowledge in electro-chemistry, galvano-plastic work in the treatment of dynamos, secondary batteries, etc. The moderate price—four francs—brings this valuable collection of standard receipts within the means of all who are engaged in practical electrical work.

"Compressed Air: Practical Information upon Air Compression and the Transmission and Application of Compressed Air." By Frank Richards, Mem. A. S. M. E. 203 pp., cloth, illustrated. Price $1.50. New York, J. Wiley & Sons, 1895.

Mr. Richards states in his title that his book is to give practical information on air compression, and, as is usual with so called practical books, he exhibits a strong disinclination to the use of a simple algebraical formulæ and a consequent loss of clearness. Throughout the book there is a strong undercurrent of feeling against electrical transmission and a decided flippancy of style. Mr. Richards takes the ground that compressed air is a much-abused method, and undue credit is given electrical transmissions for the work they have to do. If all his conclusions are drawn in the same way he compares the cost of air and electricty in the De Kalb pumping installation, this is not to be wondered at. Here he takes the contract price of doing the work by electricity, and rejoices over the fact that air could do the work for one-quarter the price, entirely ignoring the fact that there is a very fair margin of profit in the figures given for the operating company. Some of the tables given seem to be of very convenient form for air-compression calculation. The chapter on compressed-air pumping is very interesting as showing the possibilities of air in this work, but is unfortunate in not showing what is actually done. In the example given, after stating that the deciding factor was the ability to use the old pumps, he ignores the fact that if pumps, such as advocated, were used, they would have made the cost such that the decision must have been made in favor of electricity. It is to be regretted that no data is given on the performance of some of the later types of compressors, as the Riedler, with mechanically actuated valves.

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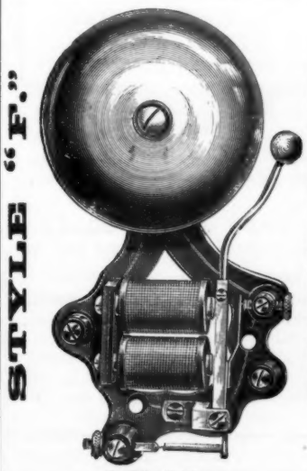

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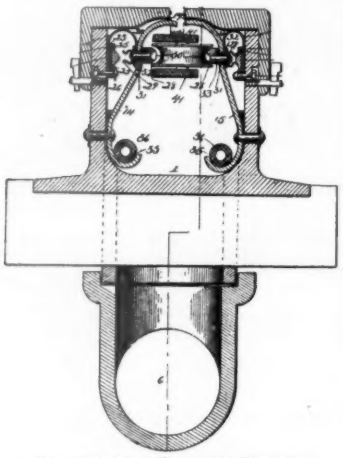
ELECTRICAL PATENTS

ISSUED JANUARY 7, 1896.

552,516 552,705 552,866 Telephone switch: G. W. McCoy, Milford, Conn.—Consists of switches in the bell and receiver circuits, the movable transmitting apparatus provided with means for actuating said switches, and a switch in the local circuit operated by the movement of the receiver.

552,521 Electric motor; S. D. Field, Yonkers, N. Y.—Consists of a motor frame

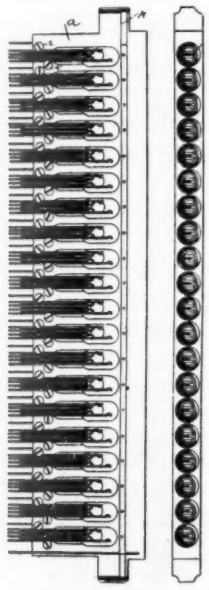


No. 552,604.—ELECTRIC RAILWAY SYSTEM.

carrying the field magnets, an armature, and brushes mounted in fixed relations to the field magnets, a support for the motor frame whereby the motor frame may be partially rotated without changing the relations of the brushes to the line of commutation.

552,540 Electric meter; W. H. McGrath, Fort Wayne, Ind., and J. M. Oram, Dallas, Tex.

552,543 Apparatus for protecting electrical circuits; J. M. Oram, Dallas, Tex.—Consists of two compound signal transmitters arranged to transmit duplicate signals, one of which breaks circuit; an electrical circuit for said transmitters, an indicator or alarm in said circuit, and means for normally operating said transmitters in unison,



No. 552,729.—SPRING-JACK SWITCH.

whereby said alarm responds only when the transmitters are out of unison.

552,553 Phase-completing device; J. T. Sibley, Clinton, Canada.

552,574 Electric switch; S. Bergmann, New York, N. Y.—A switch or cut-out, provided with two or more pairs of line wire contacts whose acting faces lie in different planes, a revoluble contact device having two or more ratchets arranged in different general planes, each ratchet having alternate conductive and non-conductive contact faces, to which the corresponding pairs of line-wire contacts are adapted.

552,594 Electric gas-lighting burner; J. E. Swendeman, Wollaston, Mass.

552,604 Electric railway system; H. Brandenburg, Chicago, Ill.—Consists of a conduit having a slot, a transversely movable slot-closer mounted permanently within said conduit and a trolley wire extending longitudinally of the conduit inclosed therein by the slot-closer, and movable transversely with said slot-closer.

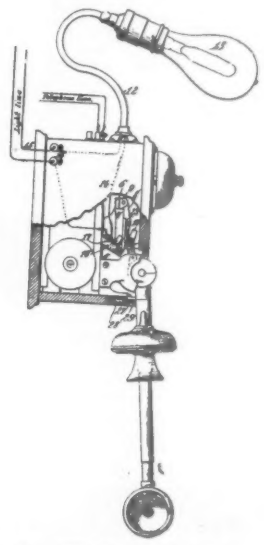
552,631 Trolley; Bert Dale, Milwaukee, Wis.—A forked trolley arm having conical apertures, a hollow trolley wheel, a sleeve extending entirely through the wheel, conical bearings located in said sleeve and engaging the conical bearings and provided with slots and springs in said sleeve.

552,658 Junction fuse and switch-box; W. F. Bossert, Utica, N. Y.—Consists of positive and negative pole pieces insulated from each other, having means for attachment of main circuit wires; a series of local circuits, a fuse wire at each end of the local circuit, spring switches at each end of the local circuit having hollows in their adjacent sides and a rotary key for operating the spring switches and engaging in the hollows.

552,680 Electric cut-out and insulator; H. A. Wagner, St. Louis, Mo.—Consists of a transformer, an inclosing box or case of metal therefor, two metallic shells carried thereby, a line wire supporting insulator mounted on each shell, and a fusible cut-out in each shell interposed in the circuit between each line wire and the coils of the transformer.

552,689 Telephone transmitter; I. D. Kusel, St. Louis, Mo.

552,723 Multiple switchboard system for telephone exchanges; C. E. Scribner, Chi-



No. 552,816.—TELEPHONE.

cago, Ill.—Consists of two electro-magnets permanently included in the same electric circuit, means for interrupting the current through one of the magnets and mechanism actuated by the magnets when simultaneously excited.

552,724 Multiple switchboard system for telephone exchanges; C. E. Scribner, Chicago, Ill.—An annunciator provided with two independently pivoted armatures, one armature carrying a hook or detent adapted to engage with and retain the other armature, which serves as a drop or target, the armature carrying the hook being adapted to be operated by a less current than is required to operate and retain in position the armature which serves as a target.

552,725 Spring-jack for telephone switchboards. 552,726 Switchboard system for telephone exchanges; C. E. Scribner, Chicago, Ill. — Consists of electro-magnets, armatures for the magnets, a catch controlled by one armature, normally engaging with an indicator, and a catch held out of engagement with the indicator by a weight.

552,727 Annunciator for telephone switchboards. 552,728 Multiple switchboard. 552,729 Spring-jack switch; C. E. Scribner, Chicago, Ill.—Consists of a telephone line, a spring jack having four contact pieces arranged in two pairs, whose members are separable, one pair being included in each line conductor, and a plug adapted to make connection with the four contact pieces.

552,730 Telephone circuit; C. E. Scribner, Chicago, Ill.

552,733 Automatic electric alarm; T. J. Stanzell, Laredo, Tex.

552,734 Telephone switchboard and circuit. 552,735 Trunk line for telephone exchanges; T. C. Wales, Boston, Mass.

552,738 Printing telegraph; J. E. Woodbridge, Duluth, Minn. Consists of a printing shaft and type wheel, a constantly driven pulley having a frictional connection with said shaft, an armature normally holding said shaft stationary, a printing lever and paper-feed mechanism actuated by the rotation of said shaft.

552,755 Conduit system for electric railways; C. A. Gaines, New York, N. Y.—Consists of an open slot and a conductor rail therein, a running plate carried by the car and traveling in the slot conduit, a trolley wheel running in the conduit on said rail, a lever pivoted to the running plate and carrying said trolley wheel, and a sliding plunger movable in said running plate and engaging said lever, whereby by moving said plunger the trolley wheel may be lifted from the rail.

552,756 Electric circuit controller; H. A. Gorn, New York, N. Y.

552,776 Electric signaling; F. G. Pratt, Revere, Mass.

552,803 Automatic electric alarm; G. B. Williams, Texarkana, Tex.

552,816 Telephone; N. L. Burchell, Washington, D. C.—Consists of a telephone, an electric lamp and lamp circuit and means operated by movement of the telephonic apparatus to the position of non-use for opening the circuit to extinguish the lamp.

552,823 Telephone system. 552,865 Telephony; F. R. Colvin, New York, N. Y.

552,832 Instrument for treatment of strictures by electrolysis; J. A. Fort, Paris, France.

552,853 Electric motor; G. L. Thomas, New York, N. Y.—Consists of a reservoir containing a volatile fluid and coil, a battery in constantly closed circuit with said coil, a motor communicating with said reservoir, condensing chamber above said reservoir, a valve provided with spring between said chamber and reservoir.

552,867 Desk telephone apparatus; G. W. McCoy, Milford, Conn.—Consists of switch mechanism, transmitting apparatus of which the transmitter is in a fixed position, and a speaking tube leading thereto and provided with an air stop or valve and adapted to operate the switch mechanism.

552,874 Electric arc lamp; W. Z. Bartholomew, Chicago, Ill.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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The Standard Air-Brake Company.

The Standard Air-Brake Company, 35 Wall street, New York city, of which Mr. E. J. Wessels is general manager, deserves the thanks of all street railway men as being the originator of the agitation which has led to increased attention being paid to street car brakes, and which will undoubtedly result in the adoption of better brakes. The Standard Air-Brake Company was the pioneer in the manufacture of air-brakes for street cars, and has been constantly endeavoring to solve the numerous problems involved in the braking question.

In a characteristic and interesting announcement on another page in this issue of the ELECTRICAL REVIEW the company illustrates a new, special type of compressor for high-speed electric cars. There are cases where a railway company, operating cars at high speeds, is reluctant to adopt an electrically driven compressor on account of cost. In such cases, and where there is a free axle obtainable, the difficulty is met by the use of this geared compressor. Its use will effect a saving in cost over the electrically driven type.

The construction of the new geared compressor is designed to meet the severe requirements of to-day's practice. It will be noticed that the gears are entirely enclosed and they are therefore protected against dirt, slush and water. They are of cast, special cut steel. This, as is well known, means long life. The cut steel gears used on modern electric motors attest this fact. One of the officials of a leading New England road stated recently that their steel cut gears had been running for over two years and showed no appreciable wear. The geared-compressor bearings are similar to motor bearings and are provided with ample lubricating facilities.

An important improvement effected by the use of this geared compressor is the ability to utilize the pony axle on a double-truck car, while at the same time the speed of the compressor is brought within a practical limit. By this means the wear and tear are very greatly reduced and it is not necessary for the eccentric to make needless revolutions. For slow-speed cars the eccentric encircling the axle answers perfectly. On higher-speed cars, however, it is not necessary to have eccentric throw as often as the increased revolutions make necessary, for it leads to unprofitable wear.

Another great improvement in the geared compressor is the valve arrangement, by means of which it is now possible to unscrew valves without loss of time and to restore them (or others) to place in less than five minutes. This makes it unnecessary to remove the car from service in case valves require adjusting or attention. The replacing can be done while car is in service. To admit of increased speed the valve ports have been enlarged and apparatus designed in various details for this end. The cut does not show that the compressor is meant to be elastically suspended. The supports are flexible, and allow the compressor to meet every condition of swiveling and the upward and downward jolt as well as side play of car body and truck. This means that when the car rides on rough rails no damage can result to the compressor, as all play is immediately taken up by the new method of suspension. Any jar of the wheels or axles is not imparted to the compressor. In this respect the suspension resembles the latest support of the modern motor. It is obvious that air-brakes and electric motors must go hand in hand, and the makers of both are likely to be in the van of the struggle for improvements.

A special feature of the geared compressor is that there is no chance for the lubricant or oil to escape. This is accomplished by an ingenious arrangement (not shown in cut), and the continuous lubrication of crank shaft is also secured. At the same time there is provision made for draining the compressor when it becomes necessary.

This new geared type will be appreciated by managers of high-speed roads who, while realizing the vital need of power brakes, do not feel able to pay the increased cost of the electrically driven compressor for the air-brake system. The company now builds an axle-driven compressor for moderate-speed cars, a geared type for high-speed cars and an electrically driven type for cars making extraordinary speeds. It is thus possible for every car in existence to be equipped with an air-brake.

The Standard Air-Brake Company closed 1895 with a larger number of installations to its credit than were made in any one year in its history. It not only supplied numerous roads in America, but its export business took a big lot of air-brakes. Those who are acquainted with General Manager Wessels' aggressiveness fully appreciate that nothing will be left undone to keep his company at the head of the street car air-brake business. He writes all the company's advertisements and finds them all the salesmen needed.

The American Association of Inventors and Manufacturers.

The fifth annual meeting of this association will be held at the Board of Trade Rooms, No. 1412 G street, N. W., Washington, D. C., Tuesday, January 21, 1896. The first session will be at 2 P. M. Officers will be elected for the coming year and other important business will be transacted. The schedule below gives the topics proposed for discussion. All members are invited to give their views on any or all of these subjects, either orally or by letter, or in more formal papers, as may be most convenient. Papers to be read should be forwarded to the secretary, George C. Maynard, 800 H street, N. W., Washington, D. C., as early as practicable.

1. The propriety of a Federal statute of limitations in patent causes.

2. The importance of having American patents granted for a definite fixed term without regard to the date of expiration of corresponding foreign patents.

3. Should not a patent become void by failure to manufacture and use the invention in such manner that it may be brought to the attention of the public within a fixed period from the date of the grant?

4. Would it not be beneficial to our patent system to so amend the patent laws that innocent users of devices and processes covered by old and unworked patents, of doubtful validity, may not be compelled to pay tribute to purchasers of such patents?

5. Should not the Commissioner of Patents be clothed with authority to appoint, on application, special examiners for taking testimony in interference proceedings, the same as special examiners are appointed by the courts in equity cases?

6. Are the new Patent Office rules abridging the time for response to official action desirable and sustainable under the statute?

7. Should or should not the United States Patent Office be made a separate and distinct department and be provided with a building of its own?

8. In view of the necessity, already arisen, of storing a part of the models elsewhere than in the Patent Office, should not models be placed, all together, in a suitable building specially designed for that purpose?

9. How can the rules of procedure in the Patent Office be amended or changed to facilitate and improve the character of the work which it is intended to accomplish?

While the foregoing subjects are deemed to be proper ones for discussion by the association, it is not intended to discourage the presentation of papers on other subjects relating to patents; and papers are invited from members of the association upon any subjects within the association's recognized field of work.

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W. H. Mansfield, of New Haven, Conn., in addition to making lathes, drills, etc., is entering the field as a dealer in second-hand machinery, to buy and sell small engines, electrical equipments, drills and lathes. His manufacturing business has increased to such an extent that he will remove to larger quarters in the near future.

The Special "Style F" pivoted armature bell which Huebel & Manger, of 286–290 Graham street, Brooklyn, have been introducing has proved a most successful instrument. This company some months ago increased their facilities for manufacturing high-grade electrical specialties and begin the new year encouraged by the outlook.

McKenney & Waterbury, 181 Franklin street, Boston, Mass., manufacturers of gas, electric and oil fixtures, have issued a very handsome calendar for 1896. It carries a splendid half-tone engraving of a handsome and intelligent-looking dog, and the words: "We are watching your interests as well as our own," and the firm's well-known motto: "We light the world."

The National India Rubber Company, Bristol, R. I., through Mr. Henry D. Stanley, have just closed a very large and important contract for N. I. R. cables, and the electrical department of the company is correspondingly happy over the order. A new catalogue is now in press, and will, as soon as issued, be sent to their many customers, as well as to any one who will send a request for a copy.

The American Electrical Works, Phillipsdale, R. I., boasts of two rifle teams, composed of the active officers and office employés of the company. One team is captained by Treasurer W. A. Hathaway and the other by Assistant Secretary C. R. Remington, Jr. At the close of the year the score of the respective teams showed the following: Captain W. A. Hathaway's team, 1,165 points; Captain C. P. Remington's team, 1,230 points, and was declared the winning team. The championship fell, however, to Secretary W. H. Sawyer, of Captain Hathaway's team, Mr. Saywer having held first position against strong competition for the last few weeks of the year solely through the use of a combination sight soon to be patented by Mr. Sawyer. At a dinner held by the two teams on January 1 Mr. Sawyer was presented with an engraving and a gold medal in honor of his fine shooting.

A Social Technical Club in Chicago.

At an informal meeting of several gentlemen held in Chicago on November 14, 1895, it was proposed to form a social Technical Club in Chicago somewhat on the same lines as the Engineers' Club, of New York, the membership to be composed of engineers, architects, railway officials and representatives of allied interests. It is proposed to provide all of the usual accommodations of a club, including a restaurant and a rather large number of sleeping rooms, and to maintain them in a thoroughly comfortable and serviceable manner on a low basis of dues. It is anticipated that the non-resident membership will be large and a special feature of the club.

It is thought by the committee on organization that if 150, or more, favorable replies to a recent circular letter are received, the organization can safely be formed. It has been suggested that charter members pay $50, this amount to cover initiation and one year's dues, and that others joining the club be required to pay this amount for initiation only; that the annual dues be $30 for resident and $20 for non-resident members, and that the club to be started in leased quarters within the central business portion of the city. Nearly 100 acceptances have already been received.

It has been proposed to run trolley trains in certain parts of Maine to supply coal to small towns that now use only wood for fuel.

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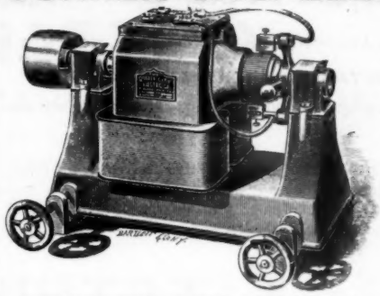

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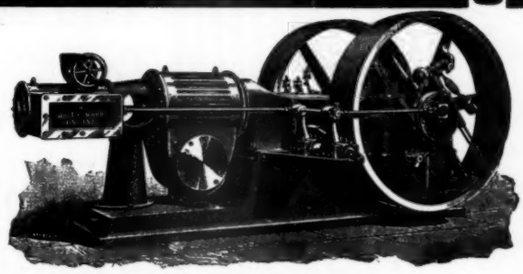

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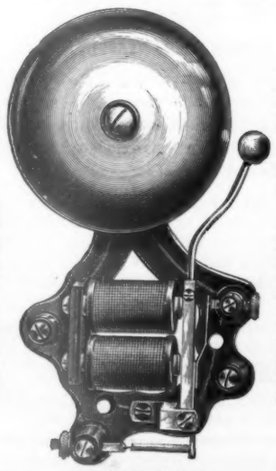

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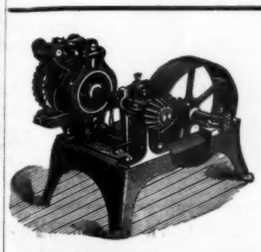

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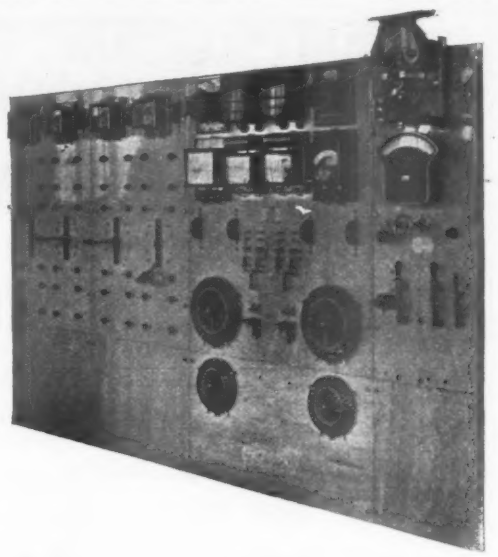

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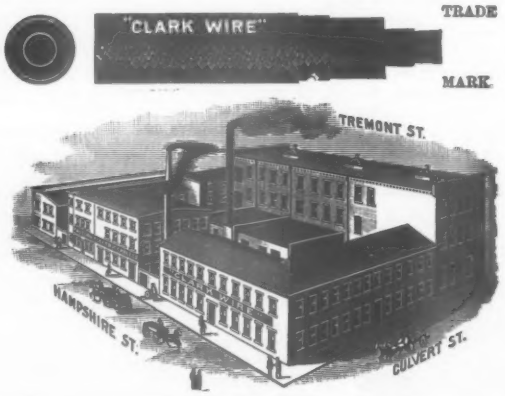

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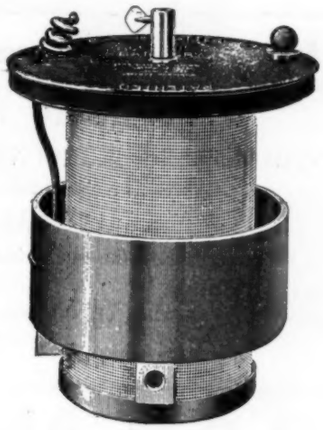

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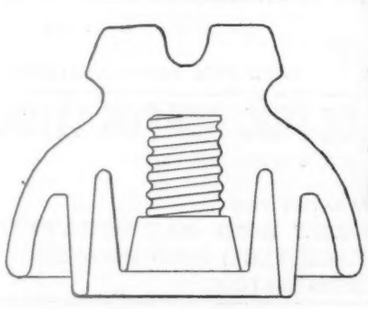

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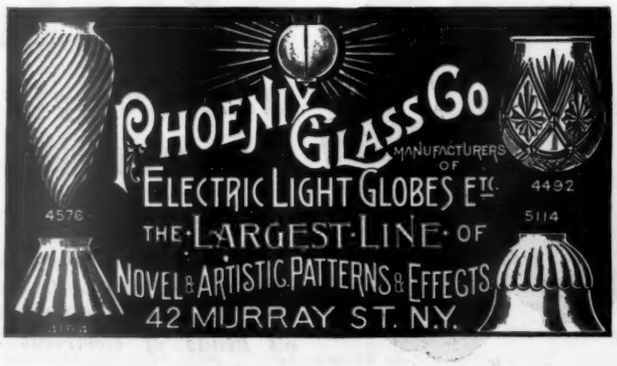

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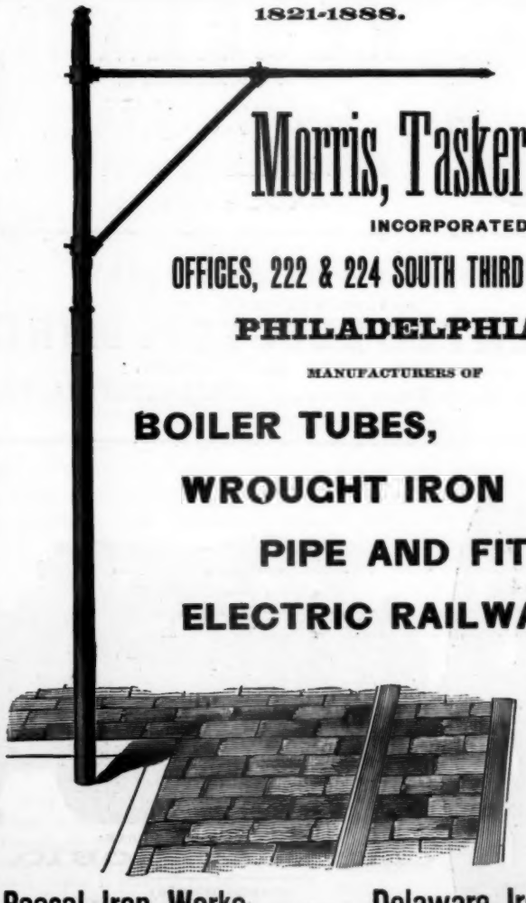

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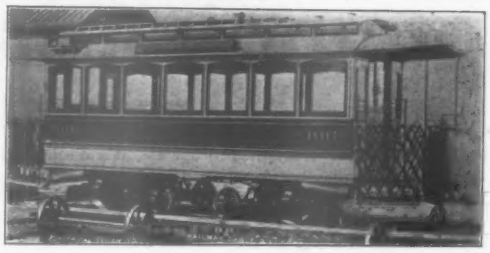

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